APPENDIX C

REGULATORY IMPACT REVIEW

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1.0 REGULATORY IMPACT REVIEW

1.1 Introduction

Management of the Federal groundfish fishery located off Alaska in the 3 to 200 nautical mile U.S. Exclusive Economic Zone (EEZ) is carried out under the Fishery Management Plan (FMP) for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area (BSAI) and the FMP for the Groundfish of the Gulf of Alaska (GOA). These FMPs and their amendments are developed under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The purpose of the FMPs is to manage the groundfish fisheries for optimum yield (OY) and to allocate harvest among user groups. The FMPs, their amendments and regulations (found at 50 CFR part 679), must also comply to other applicable Federal laws and executive orders, notably the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act, Executive Order (E.O.) 12866, and the Regulatory Flexibility Act (RFA).

This Regulatory Impact Review (RIR) evaluates the proposed Steller Sea Lion Protection Measures restricting pollock, Pacific cod and Atka mackerel fishing in the Bering Sea and Aleutian Islands (BSAI) and the Gulf of Alaska (GOA) so as to protect the endangered western stock of Steller sea lions. A detailed discussion of the environmental and management context within which this action is proposed is contained in the SEIS, which precedes this RIR. The economic and socioeconomic context is presented in the following sections.

1.1.1 Statutory Authority

Under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ), which extends between 3 and 200 nautical miles from the baseline used to measure the territorial sea. The management of these marine resources is vested in the Secretary of Commerce (Secretary) and in the Regional Fishery Management Councils. In the Alaska region, the North Pacific Fishery Management Council (Council) has the responsibility to prepare fishery management plans (FMPs) for the marine fisheries it finds that require conservation and management. The National Marine Fisheries Service (NMFS) is charged with carrying out the federal mandates of the Department of Commerce with regard to marine fish.

The groundfish fisheries in the Exclusive Economic Zone (3 to 200 miles offshore) off Alaska are managed under the Fishery Management Plan for the Groundfish Fisheries of the Gulf of Alaska and the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands Area. Both fishery management plans (FMPs) were developed by the North Pacific Fishery Management Council (Council). The Gulf of Alaska (GOA) FMP was approved by the Secretary of Commerce and became effective in 1978 and the Bering Sea and Aleutian Islands Area (BSAI) FMP became effective in 1982.

Actions taken to amend fishery management plans or implement other regulations governing the groundfish fisheries must meet the requirements of Federal laws and regulations. In addition to the Magnuson-Stevens Fisheries Conservation and Management Act (Magnuson-Stevens Act), the most important of these are the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), Executive Order (E.O. 12866), the Regulatory Flexibility Act (RFA), and the American Fisheries Act (AFA).

1.1.2 Regulatory Impact Review Requirements

This Regulatory Impact Review (RIR) provides the analysis required under Executive Order (E.O.) 12866. The following statement from the E.O. summarizes the requirements of an RIR:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nevertheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environment, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

Executive Order 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant". A "significant regulatory action" is one that is likely to:

1. Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

2. Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

3. Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4. Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

1.1.3 Purpose and Need

The primary purpose of the proposed action is to modify the BSAI and GOA pollock, Pacific cod and Atka mackerel fisheries such that the reconfigured fisheries do not jeopardize the continued existence of Steller sea lions or adversely modify their critical habitat. If more than one alternative accomplishes the primary purpose of this action, a secondary objective is to modify the fisheries such that the reconfiguration minimizes the economic and social costs that will be imposed on the commercial fishing industry and associated coastal communities.

The need for this federal action stems from several sources. First, the Council and NMFS have a responsibility to insure that fishing activities authorized under the FMPs and implementing regulation do not jeopardize the continued existence of any listed species or adversely modify its critical habitat. Second, in order for the pollock, Pacific cod, and Atka mackerel fisheries to commence on January 1, 2002, NMFS must implement a suite of Steller sea lion protection measures, be it the RPA from the 2000 Biological Opinion or some other alternative, because the emergency rules governing BSAI pollock, Pacific cod, and Atka mackerel fishing expire on December 31, 2001. Without any action by NMFS, important Steller sea lion protection measures regulating the pollock, Pacific cod, and Atka mackerel fisheries will cease to exist.

Finally, new information about Steller sea lion movements based on telemetry studies and new analysis of Steller sea lion scat samples have become available since the issuance of the 2000 Biological Opinion. An examination of that information as it relates to necessary protection measures is warranted.

This analysis evaluates alternatives to mitigate potential adverse effects as a result of competition for fish between Steller sea lions and the BSAI and GOA pollock, Pacific cod, and Atka mackerel fisheries under a no action alternative as well as four other alternatives that would substantially reconfigure these fisheries.

In 1990, the Steller sea lion was listed as threatened as defined by the ESA (62 FR 24345) throughout its range (55 FR 12645, 55 FR 13488, 55 FR 49204, 55 FR 50005). Justification was based on evidence of a major decline in their abundance throughout most of their range, but most acutely in the core region from the Kenai Peninsula to Kiska Island (Braham *et al.*, 1980; Merrick *et al.*, 1987). In this region, counts of adult and juvenile Steller sea lions had declined by about 80% since the population size was estimated in the late 1950s. On May 5, 1997, NMFS reclassified Steller sea lions into two distinct population segments under the ESA. The reclassification was based on biological information collected since the species was listed as threatened in 1990. The Steller sea lion population segment west of 144°W longitude (near Cape Suckling, Alaska) was reclassified and listed as endangered; the remainder of the U.S. Steller sea lion population remains listed as threatened.

On November 30, 2000, NMFS released a comprehensive Biological Opinion on the groundfish fisheries of the BSAI and GOA, pursuant to section 7 of the Endangered Species Act (NMFS, 2000a). The Biological Opinion concluded that fisheries for pollock, Pacific cod, and Atka mackerel jeopardize the continued existence of Steller sea lions and adversely modify their critical habitat due to competition for prey and modification of their prey field. To mitigate this situation, the Biological Opinion included a set of sea lion protective measures (termed the Reasonable and Prudent Alternative, RPA), which included closure areas, limitations on the amount of pollock, Pacific cod, or Atka mackerel that could be harvested, establishment of seasonal harvest limitations, and a long-term experimental monitoring program. A one-year phase-in of these measures was imposed by Senator Ted Steven's rider to the fiscal year 2000 appropriations bill (Pub.L. 106-554).

The 2000 Biological Opinion is based on the following perspectives: "At present, the leading hypothesis to explain the continued decline of the western population of Steller sea lions is primarily the nutritional stress of juveniles and to a lesser extent adult females (Merrick *et al.*, 1987; Pitcher *et al.,*1998; Rosen and Trites, 2000a; Alaska Sea Grant, 1993). Such nutritional stress indicates decreased foraging success, potentially as a consequence of environmentally-driven changes in prey availability, but also as a consequence of competition with the BSAI and GOA commercial groundfish fisheries." As alluded to above, "the groundfish fisheries reduce prey availability on several scales, resulting in range-wide, regional, and local depletion of prey. Fishing activity may also preclude some sea lions from certain important foraging areas simply by disturbance, or the presence of fishing vessels, gear, and activity. Since sea lions and the fisheries may well target the same aggregations of prey, such interference may reduce foraging success even when local prey are relatively abundant." (NMFS, 2000a).

The 2000 Biological Opinion concluded the following: "After analyzing the cumulative, direct and indirect effects of the Alaska groundfish fisheries on listed species, NMFS concludes that the fisheries do not jeopardize any listed species other than Steller sea lions. The 2000 Biological Opinion concludes that the fisheries do jeopardize Steller sea lions and adversely modify their critical habitat due to competition for prey and modification of their prey field. The three main prey species that Steller sea lions and these fisheries compete for are pollock, Pacific cod, and Atka mackerel. The biological opinion provides a reasonable and prudent alternative to modify the fisheries in a way that avoids jeopardy and adverse modification." (NMFS, 2000a).

The 2000 Biological Opinion included a RPA to avoid jeopardy and adverse modification of critical habitat in the above noted western region. The overall approach of the RPA involved the following strategy: 1) protect a substantial number of the rookeries and haulouts used by Steller sea lions and the marine environment immediately offshore of these areas from disturbance associated with commercial fishing for the three primary prey species (i.e., walleye pollock, Atka mackerel, and Pacific cod), 2) protect a substantial portion of critical habitat from the effects of commercial fishing on the three primary prey species, 3) ensure that adequate forage resources are available to sustain a population of Steller sea lions in excess of 34,600 animals, and 4) in areas where fishing is allowed, ensure that fishing does not create areas where Steller sea lions are not able to successfully forage (NMFS, 2000a).

Prior to NMFS' implementation of the RPA contained within the 2000 Biological Opinion, the President signed Public Law 106-554. In essence, Pub. L 106-554 at § 209(c)(2) legislated that while the 2001 BSAI and GOA groundfish fisheries will be managed in a manner consistent with the RPA contain in the Biological Opinion and as modified by other provisions of section 209, the provisions of the RPA will be phased in during the 2001 fishing year. It further legislated that the RPA contained in the Biological Opinion will become effective in its entirety on January 1, 2002, unless revised as necessary and appropriate based on independent scientific review or other new information. In accordance with Pub. L. 106-554, and starting on January 1, 2001, the 2001 BSAI and GOA groundfish fisheries were initially managed in accordance with the fishery management plans and federal regulations in effect for such fisheries prior to July 15, 2000. This initial management regime was subsequently replaced via an emergency rule issued by NMFS January 22, 2001, under the Magnuson-Stevens Act and effective on January 18, 2001 (66 FR 7276). The emergency rule contained a suite of management measures that phased-in certain provisions of the RPA. This emergency rule was extended and modified by NMFS on July 17, 2001 (66 FR 37167).

1.1.4 Steller Sea Lion Protection Measure Alternatives

At its June 2001 meeting, the Council received a report from its RPA Committee on recommendations for an alternative RPA. The Council adopted a set of final alternatives, to be examined in this SEIS/RIR. The Council's RPA Committee's recommended alternative was included as Alternative 4. A brief list of these alternatives, and options, is provided below, and more thoroughly described in Section 2.3 of this SEIS.

Alternative 1 No action. Regulatory measures implemented by emergency rule, and designed to protect Steller sea lions, would expire. *Note this alternative is presumed to violate the Endangered Species Act.*

Alternative 2 The low and slow approach. This alternative is derived from the Draft Programmatic SEIS for the Alaska groundfish fisheries (NMFS 2001a). Essentially, the approach is to establish lower total allowable catch levels (TACs) for pollock, Pacific cod, and Atka mackerel, prohibit trawling in critical habitat, and implement measures to spread out catches through the year.

Alternative 3 The restricted and closed area approach. This alternative is the RPA detailed in the November 30, 2000, Biological Opinion. Essential elements of this approach are to establish large areas of critical habitat where fishing for pollock, Pacific cod, and Atka mackerel is prohibited, and to restrict catch levels in remaining critical habitat areas.

Alternative 4 The area and fishery specific approach. This alternative was developed by the Council's RPA Committee. This approach allows for different types of management measures in the three areas (AI, BS, and GOA). Essential measures include fishery specific closed areas around rookeries and haulouts, together with seasons and catch apportionments. Three options for closure areas are examined for this alternative.

Option 1: Chignik small boat exemption.
Option 2: Unalaska small boat exemption.
Option 3: Gear specific zones for GOA Pacific cod fisheries.

Alternative 5 The critical habitat catch limit approach. This alternative is derived from the suite of RPA measures that were in place for the 2000 pollock and Atka mackerel fisheries, and measures considered for the Pacific cod fishery that include seasonal apportionments and harvest limits within critical habitat. Essentially, this alternative limits the amount of catch within critical habitat to be in proportion to estimated fish biomass.

1.2 Description of the Fisheries

The groundfish fisheries off Alaska are an economically important segment of the U.S. domestic fishing industry. Commercial groundfish catches off Alaska totaled approximately 1.7 million tons (mt) in 1999, compared to 1.9 million mt in 1998. The value of the catch at ex-vessel, *excluding* the value added by processing, was estimated at $483 million in 1999, an increase from $416 million in 1998.

Groundfish accounted for the largest share of the ex-vessel value of all commercial fisheries off Alaska in 1999 (39%), while the Pacific salmon fisheries were second, at $346 million (28% of the total value). The ex-vessel value of the shellfish catch amounted to $271 million (22% of the total).

The value of the 1999 catch, after primary processing, was approximately $1.2 billion. This estimate *includes* the "value added" by at-sea and shoreside processors, typically characterized as representing the "first wholesale" gross product value.

1.2.1 The Harvesting Sector

Alaska pollock has consistently been the dominant species in the commercial groundfish catch off Alaska.[1] The 1999 pollock catch of 1.09 million mt accounted for, on the order of two-thirds of the total groundfish harvest (down approximately 13% from a year earlier). The next major species, Pacific cod, accounted for 242,500 mt (or almost 15% of the total 1999 groundfish catch in the EEZ off Alaska). The 1999 Pacific cod catch was also down, about 6%, from a year earlier. Atka mackerel represents a much smaller portion of the total groundfish catch. In 1999, the total Atka mackerel harvest was reportedly 56.5 t, down about 1.5% from 1998. Mackerel harvests ranged from 53,000 mt to 103,867 mt between 1995 and 1999.[2]

[1]At least since the establishment of the U.S. Exclusive Economic Zone in 1976.

[2]Catch statistics for the 2000 fisheries are not reported here (in part) because of the "confounding" effect of the SSL critical habitat trawl ban on catch and landings, associated with the Federal Court's injunction, which was put in place in the 2000 fishing year. The preliminary 2000 catch data are reflected in the following set of tables, however, for completeness.

Trawling accounts for, on average, approximately 90% of the total groundfish catch, and hook and line gear accounts for another 7.9%. Commercial landings of pollock and Atka mackerel are (for all practical purposes) exclusively made by operators using trawl gear. Pacific cod is harvested by trawls (in 1999, 44% or 105,000 t); by hook and line gear (in 1999, 41% or 101,000 t); and by pots (in 1999, 15% or 35,000 t). Estimates of the numbers of vessels participating in the hook and line, pot, and trawl gear fisheries, for the three primary species of interest in the present action are presented in Table C-1.

Table C-1 Number of vessels that caught Pacific cod, pollock, or Atka mackerel by area, vessel category, target fishery, and gear, 1995-2000

Gear	Species	Year	GOA		BSAI		All Alaska	
			CV	CP	CV	CP	CV	CP
Hook and Line	Pacific Cod	95	386	20	57	44	430	46
		96	210	16	51	39	252	41
		97	394	14	31	38	412	39
		98	345	8	22	36	357	36
		99	398	22	39	38	427	41
		00	497	14	68	41	538	42
Pot	Pacific Cod	95	184	3	116	8	255	8
		96	146	0	92	13	206	13
		97	145	0	75	13	193	13
		98	166	1	71	7	211	7
		99	200	11	89	13	254	13
		00	247	5	92	9	300	11
Trawl	Pollock	95	129	8	116	45	155	45
		96	94	3	118	40	158	40
		97	119	6	106	34	173	35
		98	120	2	100	38	168	39
		99	112	0	114	17	160	17
		00	82	0	102	16	163	16
	Pacific Cod	95	143	14	86	40	185	43
		96	108	16	108	39	191	41
		97	136	6	85	41	185	43
		98	117	13	85	36	171	36
		99	106	9	81	26	170	27
		00	95	6	85	26	174	26
	Atka Mackerel	95	0	2	0	17	0	18
		96	0	9	0	17	0	18
		97	0	0	0	12	0	12
		98	0	0	0	14	0	14
		99	0	0	0	17	0	17
		00	0	0	0	12	0	12

Source: Preliminary 2001 Groundfish SAFE Report; Table 27, pages 54-55.

Over the five years (1995-1999)[3], catcher vessels (CV) took 43% of the total groundfish catch, while catcher processor (C/P) vessels took the remaining 57%, for the BSAI and GOA, as a whole. CVs took about 48% of the total, in 1999 [an increase due, in part, to American Fisheries Act (AFA) provisions which increased the share of the BSAI pollock TAC allocated to inshore processors]. Preliminary 2000 SAFE Report catch data suggest that C/Ps harvested 53.3% of the aggregate statewide groundfish catch, with the balance (46.7%) credited to CVs, in that year.

The distribution of catch, between CVs and C/P vessels, differs substantially by species and area. For Atka mackerel, effectively 100% of the commercial catch is made by C/Ps. For pollock, in the GOA[4], 100% is landed inshore. In the BSAI management area, in 1999, approximately 44% of the total pollock catch was harvested by C/Ps, with the balance caught by catcher vessels (delivering either to shoreside plants or to motherships). According to the preliminary SAFE Report, 2000 pollock catches in this area were divide 45.5% C/Ps, 54.5% CVs (with the latter total including deliveries to inshore and mothership processors).

For Pacific cod, the pattern is more complex. In 1999, in the BSAI, 100% of the longline caught Pacific cod was reportedly taken by C/Ps. In 2000, preliminary catch statistics indicate that something just over 1.0% of this catch was taken by CVs, with the balance (98.9%) landed by C/Ps. In the GOA (where 90% of the Pacific cod TAC is reserved for the inshore sector under Inshore/Offshore), in 1999 about 82% was reportedly taken by CVs, with the balance going to C/Ps. In 2000, the figure for CV catch jumped to 91.7%.

Over 81% of the BSAI pot-caught Pacific cod was taken by CVs in 1999, while in 2000 that figure was up to just over 84%. In the Gulf, in 1999, CVs accounted for 73.7% of the pot-caught Pacific cod, rising to over 94% in 2000.

Finally, in the BSAI, trawl-caught Pacific cod was more nearly evenly split, with C/Ps accounting for just over 47% of the total landings in 1999, 44.6% in 2000. In the Gulf, trawl CVs accounted for 94.6% of Pacific cod landings, while in 2000 they recorded 92% of that catch..

Alaska continues to lead all states in volume (4.9 billion pounds in 1998) and value ($951.5 million) of fisheries landings. (For perspective, Louisiana was second in that year, in both categories, at 1.1 billion pounds and $291.9 million.) Unalaska/Dutch Harbor was the leading U.S. port in quantity of commercial landings, with Kodiak third, and Seattle, Washington fifth. Dutch Harbor was also the leading U.S. port in terms of value, with Kodiak again third, nationally, in that year. Pollock ranked number one, by quantity, and fifth in value, of all U.S. commercially landed species, accounting for fully 30% of total U.S. commercially landed catch weight and 6.0% of total U.S. commercial fishery value.

1.2.2 The Processing Sectors

In this section, a general overview of the three operational sectors of the pollock, Pacific cod, and Atka mackerel *processing* industry is presented (i.e., “Inshore”, “Catcher/Processors”, “Motherships”). These data and statistics provide a ‘baseline’ description of the physical plant and activity of each of the principal processing segments of the primary target fisheries of concern in this action (e.g., BSAI pollock, Atka mackerel, and Pacific cod; WGOA and CGOA pollock and Pacific cod)

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[3]Catch statistics for the 2000 fishery were distorted by the temporary trawl ban in SSL CH imposed during the latter half of the fishing year, brought about by the Federal court’s injunction.

[4]As provided for under the Inshore/Offshore FMP Amendment 51 (64 *FR* 3653).

An annual average of 576,000 mt of product was produced from groundfish taken from the BSAI and GOA between 1992 and 1999. This equated to an average utilization rate (product tons divided by reported tons) of 28%. The estimated average annual wholesale value of production was approximately $1.2 billion, between 1992 and 1999, or ,on average, approximately $583 per reported metric ton of harvest.

1.2.2.1 Inshore Processors

Inshore plants include traditional shorebased plants that process Alaska groundfish and several floating processors that are moored or anchored nearshore in protected bays and harbors. The discussion which follows addresses the activities of plants engaged in primary processing of groundfish only (i.e., it does not include plants in Alaska or elsewhere that are engaged in secondary manufacturing activities, such as converting surimi into analog products [imitation crab], or further processing of other groundfish products into ready-to-cook meals or products). Within the context of the SSL Protection Measure action, under consideration herein, 'three' groupings of the inshore processing sector are examined, based primarily on their location. The group containing Bering Sea *pollock* inshore plants is the exception, being alternatively defined principally because of the scale of these groundfish operations, compared to other processing sectors. The three inshore processing categories, which are mutually exclusive, are defined as follows:

1. Bering Sea *pollock* inshore plants. [These include the four major shorebased BSAI pollock processors in Dutch Harbor/Unalaska and Akutan. Also included are two inshore floating processors—*Arctic Enterprise* and *Northern Victor*—that have had substantial pollock history and function from a single location in state waters off Unalaska and Akutan Islands.]

2. Alaska Peninsula and Aleutian Islands inshore plants. [These include all shore plants in the Aleutians East Borough and all shore plants in the Aleutians West Census Area, excluding all Bering Sea pollock inshore plants, referenced immediately above. These plants are much smaller than the Bering Sea pollock-inshore plants, do not have the same level of focus on pollock, and in some cases produce more salmon than groundfish.]

3. Kodiak Island inshore plants. [These include all shore plants on Kodiak Island. Many of these plants focus on groundfish, but some also process salmon and halibut, and others focus on salmon and halibut, but also process some limited amounts of groundfish.]

1.2.2.2 Mothership Processors

Motherships are intermediate (in some respects) between the Inshore plants (located at a fixed site) and Catcher/Processors (discussed below), which are highly mobile, and enjoy the added capability of catching, as well as processing. [This operational classification includes all motherships operating in the EEZ, but does not include floating processors that operate exclusively within state waters.]

Motherships receive catch 'over-the-side' from a fleet of catcher vessels which (typically) do not take their catch onboard. Instead, the codend containing the catch is passed from the catcher boat to the mothership, and the latter operator hauls the fish onboard the processing platform. Motherships have, from time to time, been employed in several groundfish fisheries off Alaska (e.g., Pacific cod, flatfish), however, they are primarily involved in the Bering Sea pollock fishery.

Three motherships were in operation in 1999 (as well as in 2000). All three have ownership or business affiliations with large Japanese-owned processing companies, and are further affiliated with some of their delivering catcher vessels.

Activities of inshore processors and motherships in the North Pacific groundfish fisheries, excluding those in areas outside the range of the western Steller sea lion population, are summarized in Table C-2.

Table C-2 BSAI and GOA inshore and mothership processor activities in all groundfish fisheries, 1991-1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Groundfish Facilities and Reported Groundfish Tons (Retained and Discarded)									
Number of Facilities	70	77	66	68	66	62	61	60	61
Thousands of Metric Tons	853.2	834.4	808.5	807.4	804.7	775.6	789.7	754.3	777.6
Total Ex-vessel Value in Major Alaska Fisheries ($Millions and Percent of Total)									
Groundfish	211.3	271.3	176	209.6	263.5	230.7	267.0	183.7	NA
Non-groundfish[a]	378.7	472.4	371.1	431.0	381.1	319.1	320.9	266.4	NA
Groundfish (% of Total)	35.8	36.5	32.2	32.7	40.9	42.0	45.4	40.8	NA
Facilities Tons by Species Groups as a Percent of Total Groundfish									
Atka m. [w/RSO]	3.6	3.5	3.2	2.9	3.1	3.5	3.2	3.2	3.2
Flatfish	7.3	5.0	3.5	4.7	5.4	4.8	6.5	2.4	2.7
Pacific Cod	12.6	11.0	10.6	11.0	15.5	16.9	16.3	12.6	12.2
Pollock	76.5	80.5	82.7	81.4	76.0	74.8	74.0	81.9	81.9
Reported Tons From FMP Subareas as a Percent of Total Groundfish									
BSAI	78.2	77.9	76.0	77.5	79.7	81.6	76.1	72.6	76.8
GOA	21.8	22.1	24.0	22.5	20.3	18.4	23.9	27.4	23.2
Ex-vessel Value Paid to Catcher Vessel Types as a Percent of Total Groundfish									
AFA Trawl with CE	23.4	23.5	20.5	21.8	20.1	18.8	19.5	18.0	NA
AFA Trawl without CE	30.1	37.4	33.2	30.6	29.5	26.0	28.5	29.6	NA
60 ft Trawl ≥	7.1	7.2	7.4	5.3	5.4	6.9	7.1	7.7	NA
< 60 ft Trawl	3.5	3.3	3.6	3.3	2.4	4.4	4.9	5.0	NA
Pot	3.2	2.9	2.9	3.0	5.2	6.1	4.3	4.3	NA
Longline	8.3	5.7	5.8	6.8	13.1	13.1	12.0	11.5	NA
Fixed-gear 33–59 ft	23.4	19.3	25.5	28.3	24.0	24.2	23.4	23.5	NA
Fixed-gear ≤ 32 ft	0.6	0.6	1.1	0.9	0.3	0.5	0.4	0.5	NA
Total Production, Product Utilization Rate, Product Value, and Value Per Ton of Round Weight									
Product (1000s of Tons)	NA	231.6	223.7	239.1	252.1	244.8	244.7	234.9	253.6
Utilization Rate (%)	NA	27.8	27.7	29.6	31.3	31.6	31.0	31.1	32.6
Product Value ($millions)	NA	609.2	408.0	502.6	640.4	547.2	560.7	504.0	503.5
Value per Ton ($)	NA	730.1	504.6	622.5	795.8	705.5	710.0	668.2	647.5

Notes: AFA – American Fisheries Act.
RSO – All rockfish species, sablefish, and 'other' groundfish, as defined in Fishery Management Plans.
CE – Crab endorsement.
NA – Data not available.
Data Sources: NMFS blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

1.2.2.3 Catcher/Processors

A catcher/processor is a fishing vessel that uses various gear types to catch fish, and then processes that catch into products onboard the vessel. American-owned catcher/processors began operating in Alaska waters in about 1983. Five different catcher/processor sectors are identified in this analysis[5], based on predominant product or gear type. These operational sectors, which for reporting purposes here are mutually exclusive, include:

- Surimi trawl catcher/processors. These factory trawlers have the necessary processing equipment to produce surimi from pollock and other groundfish. They are generally the largest of all catcher processors.

- Fillet trawl catcher/processors. These trawl vessels have the processing equipment to produce fillets from pollock, Pacific cod, and other groundfish. They are, in general, smaller than the surimi C/P vessels.

- Head-and-gut trawl catcher/processors. These factory trawlers do not process more than incidental amount of fillets. Generally they are limited to headed and gutted (H&G) products or kirimi. In general, they do not focus their efforts on pollock, but instead target flatfish, Pacific cod, and Atka mackerel. H&G C/Ps are among the smallest of the trawl catcher processors.

- Pot catcher/processors. These vessels have been used primarily in the crab fisheries of the North Pacific and Bering Sea, but increasingly have participated in the Pacific cod fisheries. They generally use pot gear, but may also use longline gear. They produce whole or H&G groundfish products, some of which may be frozen in brine, rather than blast frozen.

- Longline catcher/processors. These vessels, also known as freezer longliners, use longline gear, and focus on Pacific cod. Most longline catcher processors are limited to H&G products and, in general, are somewhat smaller than H&G trawler C/Ps.

Activities of domestic catcher/processors in all North Pacific and Bering Sea groundfish fisheries are summarized in Table C-3. The number of active catcher/processors peaked at 137 in 1992, then declined to 89 in 1999. The decline in catcher/processors from 1998 to 1999 is directly related to the AFA, which removed nine trawl catcher/processors from the fishery. Earlier declines were most likely the result of declining opportunities for catcher/processors, primarily as a result of inshore-offshore pollock and Pacific cod allocations.

Between 1991 and 1998, catcher/processors harvested an average of 62% of all groundfish in the North Pacific and Bering Sea, but in 1999 catcher/processors accounted for only 52% of the total. That decline was primarily a result of the shift of BSAI pollock quotas to inshore operators, mandated by provisions of the AFA. Almost 60% of all groundfish catches reported by catcher/processors since 1991, have been composed of pollock, while flatfish accounted for more than 17%, and Pacific cod approximately 13%. On the order of 95% of all catcher/processor harvests have come from the BSAI.

Between 1992 and 1999, catcher/processors generated an average of 355,000 mt of product, with an average annual wholesale value of $712 million. The average catcher/processor generated product valued at $570 per metric ton. Over the eight years from 1992 to 1999, catcher/processors improved their average utilization rate (the proportion of product weight to round weight) from less than 24% to 32%.

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[5]Catcher/Processor definitions employed here are consistent with those used in the Draft Programmatic SEIS (NMFS 2001a).

Table C-3 BSAI and GOA catcher/processor activities in all groundfish fisheries, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Retained Groundfish Tons									
Number of Vessels	118	137	121	118	118	114	110	99	89
Thousands of Metric Tons	1,543	1,432	1,331	1,370	1,338	1,270	1,268	1,110	874
Reported Tons of Species Groups as a Percent of Total Groundfish									
Atka Mackerel (w/RSO)	5.6	9.7	10.9	9.5	10.5	13.0	9.8	10.1	13.5
Flatfish	13.9	17.2	17.0	18.3	16.4	18.7	23.2	18.5	18.9
Pacific Cod	10.5	13.0	10.1	10.9	14.2	13.8	15.5	14.6	16.5
Pollock	70.0	60.0	61.9	61.2	58.9	54.6	51.6	56.8	51.2
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
BSAI	94.8	94.3	95.6	96.4	96.1	95.5	97.0	96.7	94.9
GOA	5.2	5.7	4.4	3.6	3.9	4.5	3.1	3.3	5.1
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight									
Product (thousands of metric tons)	NA	338.8	321.5	331.3	345.7	355.1	355.3	316.4	279.6
Utilization Rate (%)	NA	23.7	24.2	24.2	25.8	28.0	28.0	28.5	32.0
Product Value ($millions)	NA	812.0	584.8	622.9	747.7	681.1	639.0	543.9	488.2
Value Per Ton ($)	NA	567.1	439.5	454.6	558.7	536.5	503.9	490.3	558.8

Notes: RSO – All rockfish species, sablefish, and 'other' groundfish, as defined.
NA – Data not available.
Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

The following section will examine each of the primary "*processing*" sectors in greater individual detail. Between 1991 and 1994, *groundfish* delivered to inshore processors and motherships accounted for approximately 34% of the total ex-vessel value of deliveries (i.e., groundfish and non-groundfish, such as salmon, crab, halibut, and herring). From 1995 through 1998, the relative importance of groundfish to these operators increased to more than 42% of the total ex-vessel value of all delivered harvests.

Between 1991 and 1998, inshore processors and motherships received catches which accounted for an average of 38% of all groundfish harvested in the North Pacific, with the balance accruing to at-sea processors. But in 1999, the inshore and motherships processors' share accounted for 48% of the total. The increase in 1999 is primarily a result of the shift of BSAI pollock quotas to inshore operators, under the AFA. Almost 79% of all groundfish deliveries reported by inshore and mothership processors since 1991 has been pollock, while Pacific cod accounted for more than 13%, and Atka mackerel (grouped with RSO) and flatfish species accounted for less 5.0% each. Approximately 69% of all harvests delivered to inshore processors and motherships have come from the BSAI.

Inshore processors and motherships have generated an average of 240,000 mt of product, with an average annual first wholesale value of $534 million, between 1992 and 1999. The average ton of output produced by inshore processors and motherships has generated a price of $670.00. Over an 8-year period, inshore processors and motherships improved their utilization rate (the proportion of product weight to round weight) from less than 27.8% in 1992, to 32.6% in 1999.

In the BSAI, WGOA and CGOA management areas, 29 facilities contributed to the inshore and mothership processing total, in 1999. The six Bering Sea *pollock* inshore plants were the most substantial contributors, producing 53% of the estimated total wholesale value. Processors in Kodiak accounted for an estimated 15% of the wholesale value. Shore plants in south-central Alaska reported only 1.5% of total catch by volume, but because of their focus on high-value species, generated 5.0% of total value. Motherships generated 8.0%

of the total processed product value of these combined sectors, accounting for approximately 13% of the total harvest.

Bering Sea 'Pollock' Inshore Plants

Description of this Operational Category
These facilities include the major onshore plants at Unalaska/Dutch Harbor and Akutan, as well as the two large floating pollock processing platforms that are typically anchored near Unalaska Island. These shorebased and nearshore plants are the primary markets for groundfish catcher vessels operating in the BSAI, particularly those harvesting pollock. The plants operate year-round, processing almost all species harvested in the Bering Sea, Aleutian Islands, and western GOA FMP subareas. Pollock is the largest species processed at these plants, in both volume and value. Pacific cod is the next most important groundfish species, with flatfish and sablefish representing much smaller proportions of harvest and value. These plants also process large amounts of crab from the BSAI, substantial amounts of halibut, but very little salmon.

Participation in Groundfish Fisheries
Inshore plants processing Bering Sea pollock are summarized in Table C-4. From 1991 through 1999, six Bering Sea pollock inshore plants were in operation—three at Dutch Harbor, one at Akutan, and two floating processors. From 1992 to 1999, five of the six plants produced surimi. While all the facilities have the capacity to produce fillets, three have a much more significant history in fillet production and tend to produce pollock and Pacific cod fillets. The other three process much higher percentages of surimi and tend to produce headed and gutted or salted products, rather than fillets, from Pacific cod. In 1999, these processors received deliveries in excess of 477,400 round weight tons of groundfish. Pollock accounted for 90% of this total and Pacific cod accounted for 8.0%. Between 1991 and 1999, all six processors reported receiving fish from the Bering Sea every year. In addition, most processors reported receiving fish every year from the Aleutian Islands, western GOA, and central GOA management areas. In 1999, approximately 99% of the groundfish processed in the Bering Sea pollock inshore sector came from the eastern Bering Sea.

Ex-vessel Payments to Catcher Vessels
Bering Sea pollock inshore processors historically have purchased more groundfish than non-groundfish species from catcher vessels. The percentage of total ex-vessel value paid for groundfish has fluctuated between 50% and 70% of total ex-vessel payments, for the period 1991–1998. Approximately 57% of the total ex-vessel payments in 1998 were for groundfish species. Crab, which accounted for 40% of the total ex-vessel value paid to catcher vessels in 1998, is the other important species for this operational category of Bering Sea inshore processors. Total ex-vessel payments for groundfish in the sector were almost $75 million, in 1998. The total wholesale gross product value for these plants from groundfish resources, in 1999, was equal to $268 million. Half of this total value came from surimi.

Table C-4 Bering Sea pollock inshore plants, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Groundfish Facilities and Reported Groundfish Tons (Retained and Discarded)									
Number of Facilities	6	6	6	6	6	6	6	6	6
Thousands of Metric Tons	527.7	474.3	477.0	493.3	494.0	474.5	462.0	417.9	477.4
Total Ex-vessel Value in Major Alaska Fisheries ($Millions and Percent of Total)									
Groundfish	82.9	128.2	70.6	85.6	111.6	90.4	105.6	68.5	NA
Non-groundfish[a]	65.7	68.8	68.5	58.1	52.7	44.6	44.4	52.8	NA
Groundfish (% of Total)	55.8	65.1	50.8	59.6	67.9	66.9	70.4	56.5	NA
Facilities Tons by Species Groups as a Percent of Total Groundfish									
Flatfish	3.6	2.3	1.7	3.7	3.8	3.6	6.0	1.5	1.6
Atka mackerel [w/RSO]	1.2	0.9	0.6	0.5	0.7	0.9	0.9	0.9	0.5
Pacific Cod	9.5	6.2	6.8	8.3	11.2	12.3	12.1	9.4	7.7
Pollock	85.7	90.6	90.9	87.5	84.3	83.2	81.0	88.2	90.2
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
Aleutian Islands	1.4	3.3	3.8	3.9	3.9	2.5	1.9	2.0	0.1
Bering Sea	91.0	91.7	92.3	94.2	92.2	97.1	95.0	95.5	99.2
Western GOA	7.5	3.8	2.5	1.6	3.7	0.3	2.9	2.2	0.6
Central GOA	0.1	1.2	1.4	0.4	0.2	0.1	0.2	0.3	0.1
Eastern GOA	0.0	b	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ex-vessel Value Paid to Vessel Types as a Percent of Total Groundfish									
Trawl AFA with CE	42.9	38.0	39.8	41.4	36.8	38.2	38.6	36.6	NA
Trawl AFA without CE	45.6	53.4	54.7	53.1	53.3	51.0	51.7	55.6	NA
Trawl ≥ 60 ft	5.2	4.0	2.1	1.9	1.6	2.2	1.6	0.4	NA
TCV < 60 ft	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	NA
Pot	0.6	1.3	1.0	2.5	4.7	6.1	5.1	5.0	NA
Longline	2.8	1.7	1.3	0.7	2.4	1.6	2.3	1.7	NA
Fixed-gear 33–59 ft	2.1	1.3	1.0	0.4	1.1	0.8	0.6	0.4	NA
Fixed-gear ≤ 32 ft	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.1	NA
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight[c]									
Product (thousands of metric tons)	NA	141	137.3	160.3	168.2	160.5	155.2	144.4	164.8
Utilization Rate (%)	NA	29.7	28.8	32.5	34.1	33.8	33.6	34.5	34.5
Product Value ($millions)	NA	337.4	185.3	259.8	340.4	286.5	283.9	253.9	268.4
Value per Ton ($)	NA	711.4	388.5	526.7	689	603.8	614.5	607.6	562.2

Notes: [a]Salmon, crab, halibut, and other.
[b]Number cannot be released because of confidentiality restrictions. Estimate was added to central GOA total.
[c]Production data for inshore plants in 1991 were incomplete, therefore estimates for 1991 are not available.
AFA – American Fisheries Act.
RSO – All rockfish species, sablefish, and other groundfish, as defined.
CE – Crab endorsement.
NA – Data not available.
Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Alaska Peninsula and Aleutian Islands Inshore Plants

Description of this Operational Category

This sector includes inshore plants located along the Alaska Peninsula, and in the Aleutian Islands, and Pribilof Islands, that process groundfish from the BSAI management areas. The geographic area extends from Chignik, westward to Adak, and north to Saint Paul Island. This group of processing facilities also includes several smaller non-AFA plants in Unalaska/Dutch Harbor. These facilities were separated from the former group because of their substantially lower processing capacity, compared to the Bering Sea *pollock* inshore plants category, and the differences in primary target species.

Participation in Groundfish Fisheries

Inshore plants processing groundfish on the Alaska Peninsula and Aleutian Islands are summarized in Table C-5. In 1999, there were ten Alaska Peninsula and Aleutian Islands inshore plants participating in the groundfish fishery. Between 1991 and 1999, the number ranged from six to ten facilities. Over the same period, almost all of these operations reported receiving fish every year from the BSAI management area. Most of these processors also reported receiving fish from the western and central GOA management areas. In 1999, these facilities processed 66,635 round weight mt, of which 43,646 mt (66%) was pollock and 19,402 mt (30%) was Pacific cod. Also in 1999, 36,652 mt (55% of the total) came from the western GOA and 21,643 mt (32%) came from the BSAI.

Ex-vessel Payments to Catcher Vessels and Product Value

Each year, from 1991 through 1998, groundfish accounted for less than 30% of ex-vessel value for these operations. In 1998, crab accounted for 44% of total ex-vessel value and salmon accounted for 30%, while groundfish (all species) accounted for only 23% of the total. Total ex-vessel payments for groundfish in the Alaska Peninsula and Aleutian Islands sector were less than $20 million in 1998. Total groundfish product value was estimated to be $50 million in 1998 and $57 million in 1999. In 1999, 21% of the total groundfish product value came from head-and-gut and whole products, while 79% of the total product value came from fillets, surimi, roe, and other products.

Alaska Peninsula and Aleutian Islands facilities tend to buy more of their fish from trawl catcher vessels than from other gear types. In 1998, for example, trawl catcher vessels received roughly 70% of the total ex-vessel value paid for groundfish, by this sector (with the under 60-ft LOA vessels being the largest single recipient).

Table C-5 Alaska Peninsula and Aleutian Islands inshore plants, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Groundfish Facilities and Reported Groundfish Tons (Retained and Discarded)									
Number of Facilities	7	8	7	7	7	6	7	7	10
Thousands of Metric Tons	33.3	44.0	57.2	58.3	73.2	73.7	70.5	68.6	66.6
Total Ex-vessel Value in Major Alaska Fisheries ($Millions and Percent of Total)									
Groundfish	14.4	16.4	12.2	13.0	21.3	22.5	22.2	16.7	NA
Non-groundfisha	78.8	107.0	92.3	111.9	98.3	60.4	59.0	56.4	NA
Groundfish (% of Total)	15.5	13.3	11.7	10.4	17.8	27.1	27.4	22.8	NA
Facilities Tons by Species Groups as a Percent of Total Groundfish									
Flatfish	8.2	4.6	3.3	5.2	1.8	2.4	2.2	1.2	2.7
Atka Mackerel [w/RSO]	6.6	3.8	1.8	1.4	1.8	1.9	1.4	2.0	2.6
Pacific Cod	68.6	63.7	39.7	37.6	27.6	42.5	38.2	31.8	29.1
Pollock	16.7	27.9	55.2	55.9	68.8	53.2	58.2	65.0	65.5
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
BSAI	17.0	29.9	51.1	38.6	54.4	37.9	27.1	15.0	32.5
Western GOA	63.3	45.0	35.4	37.1	34.2	50.6	b	b	55.0
Central GOA	19.7	25.0	13.5	24.2	11.3	11.5	72.9	85.0	12.5
Eastern GOA	b	0.0	0.0	0.0	0.0	0.0	b	b	b
Ex-vessel Value Paid to Vessel Types as a Percent of Total Groundfish									
Trawl AFA with CE	11.8	6.0	9.5	18.1	25.9	15.0	15.4	11.9	NA
Trawl AFA without CE	15.7	23.6	29.1	22.4	21.3	15.4	15.6	16.3	NA
Trawl $\geq$ 60 ft	9.6	11.2	15.7	7.6	4.5	6.6	6.5	8.0	NA
TCV < 60 ft	32.4	35.1	33.1	35.8	15.9	28.9	40.3	37.2	NA
Pot	4.3	4.7	2.1	3.3	9.1	14.0	6.1	2.3	NA
Longline	13.1	8.4	5.9	6.3	12.3	10.4	5.1	7.1	NA
Fixed-gear 33–59 ft	12.8	10.7	4.5	5.3	10.5	9.2	10.6	16.8	NA
Fixed-gear $\leq$ 32 ft	0.2	0.3	0.1	1.2	0.3	0.4	0.4	0.4	NA
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight[c]									
Product (thousands of metric tons)	NA	12.1	15.3	12.5	15	17.1	21	20.9	26.2
Utilization Rate (%)	NA	27.5	26.8	21.4	20.5	23.3	29.8	30.4	39.3
Product Value ($millions)	NA	36.6	32.6	31.5	46.2	45.2	46.6	50.4	56.7
Value per Ton ($)	NA	830	569	540.7	631.7	612.5	661.1	735.3	851.6

Notes: [a]Salmon, crab, halibut, and other.
[b]Number cannot be released due to confidentiality restrictions. Estimate was added to central GOA total.
[c]Production data for inshore plants in 1991 was incomplete, therefore estimates for 1991 are not available.
AFA – American Fisheries Act..
RSO – All rockfish species, sablefish, and 'other' groundfish, as defined.
CE – Crab endorsement.
NA – Data not available.

Sources: NMFS Blend data and NMFS Weekly Processor Report Data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Kodiak Island Inshore Plants

Description of this Operational Category
This sector includes processing facilities on Kodiak Island. Inshore plants on Kodiak Island processing groundfish are summarized in Table C-6. While there has been year-to-year variation, the number of Kodiak Island plants processing groundfish has generally trended down over the period 1991 to the present. In 1999, there were ten facilities processing groundfish; in 1998, there were only nine, but in 1992, there were as many as fifteen.

Participation in Groundfish Fisheries
Most plants process all four of the major species groups, e.g., pollock, Pacific cod, Atka (w/RSO), and flatfish, every year, although the number of plants processing pollock is generally smaller than the number processing other species. In 1999, all of the facilities processed Pacific cod and the Atka (w/RSO) group. In addition, nine of the ten processed pollock and flatfish. In total, these ten facilities processed 101,354 round weight mt of groundfish in 1999; 51% of which was pollock and 30% of which was Pacific cod. All of the plants receive fish from the central GOA management area every year. Most of the plants also receive fish from the western GOA (and eastern GOA) management areas.

Ex-vessel Payments to Catcher Vessels by and Product Value
From 1991 through 1998, groundfish accounted for less than 50% of total ex-vessel value each year, though the percentage increased from just over 30% in 1991. In 1998, groundfish accounted for 46% of the total ex-vessel value in the Kodiak sector, salmon accounted for 39%, and halibut accounted for 11%. Total ex-vessel payments for groundfish were less than $30 million, in 1998. Total groundfish product value was estimated to be $70 million in 1998 and $74 million in 1999. Approximately 62% of the wholesale production value of groundfish products, in 1999, came from fillets and 14% came from surimi.

A greater share of the total ex-vessel payments from Kodiak inshore plants went to trawls, than to other vessel gear types, although fixed-gear vessels (primarily those 33'–59' LOA) also accounted for a significant portion of total ex-vessel value. In 1998, for example, trawl catcher vessels received just over 60% of the total ex-vessel payments in the Kodiak sector.

Table C-6 Kodiak Island inshore plants, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Groundfish Facilities and Reported Groundfish Tons (Retained and Discarded)									
Number of Facilities	14	15	14	12	11	9	9	9	10
Thousands of Metric Tons	83.0	92.2	111.9	98.9	76.8	66.0	83.7	96.8	101.4
Total Ex-vessel Value in Major Alaska Fisheries ($Millions and Percent of Total)									
Groundfish	30.2	32.9	26.9	26.0	28.7	25.9	30.7	25.7	NA
Non-groundfish[a]	64.1	57.0	49.2	44.7	59.0	42.0	37.1	31.0	NA
Groundfish (% of total)	32.0	36.6	35.4	36.8	32.7	38.1	45.3	45.3	NA
Facilities Tons by Species Groups as a Percent of Total Groundfish									
Flatfish	16.1	16.0	15.0	13.0	16.2	23.0	18.2	8.7	8.5
Atka Mackerel (w/RSO)	7.0	6.3	5.6	4.5	6.6	12.6	9.4	7.7	9.7
Pacific Cod	27.5	18.5	19.8	16.2	40.9	35.8	34.9	24.8	30.3
Pollock	49.4	59.2	59.6	66.3	36.3	28.6	37.5	58.8	51.4
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
BSAI	0.2	5.9	1.7	0.6	0.3	0.5	0.0	0.0	0.1
Western GOA	0.5	0.1	b	b	0.8	0.2	b	b	b
Central GOA	99.3	93.9	98.3	92.9	97.9	98.9	99.6	99.7	99.7
Eastern GOA	0.1	0.1	b	6.6	1.0	0.4	0.4	0.3	0.2
Ex-vessel Value Paid to Vessel Types as a Percent of Total Groundfish									
Trawl AFA with CE	4.1	5.5	5.9	8.0	3.4	2.7	3.7	5.7	NA
Trawl AFA without CE	34.0	31.5	30.8	29.4	19.1	14.4	23.3	22.8	NA
Trawl ≥ 60 ft	19.1	24.5	26.2	23.5	27.6	33.4	34.4	33.6	NA
Trawl < 60 ft	3.4	4.1	4.4	4.6	6.5	8.7	4.8	4.4	NA
Pot	10.7	7.5	7.5	7.6	10.7	10.2	5.2	9.1	NA
Longline	9.2	6.6	7.5	7.7	11.5	11.4	10.2	6.3	NA
Fixed-gear 33–59 ft	19.3	19.8	17.6	18.9	21.0	17.3	17.6	17.1	NA
Fixed-gear ≤ 32 ft	0.3	0.5	0.2	0.3	0.2	1.8	0.8	1.0	NA
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight[c]									
Product (thousands of metric tons)	NA	23.9	28.9	25.8	24.3	20.5	21.5	24.1	27.7
Utilization Rate (%)	NA	26	25.8	26.1	31.6	31	25.7	24.9	27.3
Product Value ($millions)	NA	69	72.3	77.5	84	63.4	62.9	70.4	74
Value per Ton ($)	NA	748.4	645.8	783.9	1,093.7	960.5	751.5	727.2	729.9

Notes: [a]Salmon, crab, halibut, and other.
[b]Number cannot be released because of confidentiality restrictions. Estimate was added to central GOA total.
[c]Production data for inshore plants in 1991 were incomplete, therefore estimates for 1991 are not available.
AFA – American Fisheries Act.
RSO – All rockfish species, sablefish, and other groundfish, as defined.
CE –Crab endorsement.
NA – Data not available.

Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Motherships

Description of this Operational Category

This processor category was identified separately from the others above, because vessels in this category form a distinct processing sector (not only operationally, but under regulation, e.g., AFA). Motherships are highly mobile operations, which move freely in the EEZ, along with a small fleet of trawl catcher vessels which provides raw fish to the onboard processing lines.

Participation in Groundfish Fisheries

Mothership participation in the groundfish fisheries is summarized in Table C-7. In 1999, there were three motherships participating in the region's groundfish fisheries. This number is down considerably from a high of 12 in 1991, and from 7 in 1995. In recent years, all motherships participating in the fishery reported processing all major species of groundfish. All the ships reported receiving fish from the Bering Sea Aleutian Islands, while only a portion reported receiving fish from the GOA. This processing sector does not participate, to any significant degree, in other non-groundfish fisheries. In 1999, motherships processed 101,384 mt of groundfish, 100,388 mt of which (99%) was pollock. Confidentiality constraints make it impossible to report exactly what percentage of the volume came from the BSAI and what came from the GOA areas.

Table C-7 Motherships, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Groundfish Facilities and Reported Groundfish Tons (Retained and Discarded)									
Number of Facilities	10	12	4	5	7	6	4	4	3
Thousands of Metric Tons	177.4	187.3	125.1	119.0	128.9	132.7	133.8	129.3	101.4
Total Ex-vessel Value in Major Alaska Fisheries ($Millions and Percent of Total)									
Groundfish	25.4	41.2	17.8	17.8	22.5	21.4	25.8	17.9	NA
Non-groundfish[a]	NA	NA	NA	NA	NA	NA	NA	NA	NA
Groundfish (% of Total)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Facilities Tons by Species Groups as a Percent of Total Groundfish									
Flatfish	14.6	6.5	0.2	2.3	7.5	1.2	1.9	0.3	0.5
Atka Mackerel (w/RSO)	1.1	1.6	0.2	0.1	0.3	0.2	0.2	0.0	0.1
Pacific Cod	2.6	4.7	0.6	2.4	6.2	6.2	6.3	1.0	0.4
Pollock	81.7	87.2	99.0	95.2	86.0	92.4	91.5	98.7	99.0
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
BSAI	98.1	96.4	100.0	100.0	98.1	99.3	100.0	100.0	100.0
GOA	1.9	3.6	c	c	1.9	0.7	c	0.0	c
Ex-vessel Value Paid to Catcher Vessel Types as a Percent of Total Groundfish									
Trawl AFA with CE	59.9	44.4	45.1	52.7	53.3	46.7	49.8	51.9	NA
Trawl AFA without CE	27.2	38.8	44.2	38.0	40.6	46.3	47.6	47.9	NA
Trawl ≥ 60 ft	12.9	16.8	10.7	9.3	6.1	6.9	2.6	0.2	NA
Trawl < 60 ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Pot	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Longline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Fixed-gear 33–59 ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Fixed-gear ≤ 32 ft	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight[c]									
Product (thousands of metric tons)	NA	39.5	27	26.2	30.5	33.1	29.9	26.6	21.1
Utilization Rate (%)	NA	21.1	21.6	22	23.6	24.9	22.3	20.6	20.8
Product Value ($millions)	NA	100.2	45.2	54.2	80.2	70.6	75.9	50.6	40.1
Value per Ton ($)	NA	535.2	361.3	455.2	622.3	532.3	567.2	391.3	395.2

Notes: [a]Motherships may have participated in non-groundfish fisheries, but data for ex-vessel values of deliveries of non-groundfish species were not available. Motherships are also known to participate in the Pacific whiting fishery.
[b]Number cannot be released because of confidentiality restrictions. Estimate was added to BSAI total.
[c]Production data for motherships in 1991 was to be incomplete, therefore estimates for 1991 are not available.
AFA – American Fisheries Act.
RSO – All rockfish species, sablefish, and other groundfish, as defined.
CE – Crab endorsement.
NA – Data not available.

Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Catcher/Processors

Catcher/processor activities, by operational class, for 1999, are summarized in Table C-8. Of 89 catcher/processors, 40 were trawl catcher/processors, and 49 used longlines or pots. The 12 surimi trawl catcher/processors had the highest total catch and generated more than 40% of the estimated total wholesale value. H&G trawler catcher/processors generated 31% of total wholesale value, among C/Ps. Longline catcher/processors accounted for 44% of the vessels, and 21% of total wholesale value.

Table C-8 BSAI and GOA catcher/processor activities, 1999

Catcher/Processor	**Vessel Counts**	**Reported Harvest—Retained and Discarded (Thousands of Metric Tons)**				**Wholesale Value ($Millions)**
Vessel Category		Pollock	Pacific Cod	Atka Mackerel (w/RSO)	Flatfish	
Surimi Trawl	12	333.8	3.2	1.7	14.9	199.0
Fillet Trawl	4	79.8	9.9	0.3	1.0	55.2
H&G Trawl	24	29.4	28.1	98.4	143.2	124.3
Longline	40	3.9	95.5	17.0	6.0	102.7
Pot	9	0.0	7.4	0.1	0.0	7.0
All Catcher/ Processors Total	89	446.9	144.1	117.5	165.1	488.2

Notes: RSO – All rockfish species, sablefish, and ‘other’ groundfish, as defined.
Modified from Original
Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Each catcher/processor operational category is described in more detail in the following subsections. The summary profiles are condensed versions of detailed profiles (found in Northern Economics August 2000).

Surimi Trawl Catcher/Processors

Description of this Operational Category
Surimi trawl catcher/processors range from 224' to 386' LOA, have an average rating of more than 500 gross tons, 6,200 horsepower, and are capable of harvesting 400 mt or more of fish daily, producing 100 mt or more of frozen surimi or fillets per day. They typically have a full processing deck below the main deck, plus a lower deck of freezer holds. The size of these vessels enables them to continue to operate, even during very poor weather and sea conditions.

These vessels now operate in a pollock cooperative, under provisions of the AFA, which, along with the resulting quasi-property rights, allows them to modify operations in terms of when they fish and what they process, to better account for changing weather/sea conditions , condition of the fish, markets, bycatch considerations, and management restrictions.

Participation in Groundfish Fisheries
In 1999, 12 of these vessels reported groundfish landings in the BSAI, down from a high of 20 in the early and mid-1990s (Table C-9). This reduction was due to a combination of excess capacity in pollock surimi production, reduced offshore sector quotas, and vessel decommissioning under the AFA. All 12 vessels reported harvests in all four groundfish species groups. This fact is primarily a function of incidental catches

of other species within the pollock fishery, rather than targeted efforts for non-pollock species (as may be observed from the reported volumes, cited in Table C-9).

Groundfish Landings by Species
In 1991, vessels in this group processed 756,268 round weight tons, and in 1999, only 353,587 round weight tons. Pollock typically accounted for 90% or more of total tons reported. In 1999, for example, pollock represented 94% of total tons (up from 90% in 1998). Total wholesale production value fluctuated between $193 million in 1998 and $397 million in 1992. Total wholesale product value of groundfish resources in 1999, was $199 million, with surimi at $90 million, fillets at $61 million, and pollock roe at $33 million.

Table C-9 Surimi trawl catcher/processors

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Retained Groundfish Tons									
Number of Vessels	19	20	18	20	20	18	16	16	12
Thousands of Metric Tons	756.3	669.9	513.9	601.2	586.1	507.4	480.7	452.5	353.6
Reported Tons of Species Groups as a Percent of Total Groundfish									
Flatfish	2.8	3.6	4.0	5.7	6.3	10.3	7.5	6.2	4.2
Atka Mackerel (w/RSO)	1.4	2.1	0.6	2.1	2.2	2.1	3.0	2.1	0.5
Pacific Cod	2.2	1.7	1.3	1.7	2.7	1.5	0.9	1.4	0.9
Pollock	93.6	92.6	94.1	90.5	88.7	86.1	88.7	90.3	94.4
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
Aleutian Islands	11.1	6.8	6.4	8.2	9.1	4.9	5.4	5.2	0.4`
Bering Sea	86.8	92.7	93.6	91.8	90.8	95.0	94.6	94.8	99.6
GOA	2.2	0.5	0.1	0.0	0.1	0.2	0.0	0.0	0.0
Total Production, Product Utilization Rate, Product Value, and Value per Metric Ton of Round Weight									
Product (thousands of metric tons)	NA	119.2	95.5	120.2	125.7	115.7	103.2	98.3	93.0
Utilization Rate (%)	NA	17.8	18.6	20.0	21.4	22.8	21.5	21.7	26.3
Product Value ($millions)	NA	397.4	200.0	257.5	351.3	246.9	259.1	192.8	199.0
Value per Metric Ton ($)	NA	593.3	389.2	428.3	599.4	486.7	538.9	426.0	562.9

Notes: [a]Includes skipper, crew, and support staff.
[b]Includes estimates for residents of other regions.
RSO – All rockfish species, sablefish and 'other' groundfish, as defined.
NA – Data not available.
Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from original source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Fillet Trawl Catcher/Processors

Description of this Operational Category
Fillet trawl catcher/processors are defined as a distinct sector because they do not have the capability to produce surimi, and because of their focus on (generally) higher value, but more labor-intensive, fillet production.

Vessels in this fleet average 240 ft LOA (second in size only to surimi vessels), and average more than 460 gross tons and 4,200 horsepower. They are equipped with a full processing deck below the main deck, plus a lower deck of freezer holds (similar to surimi trawl catcher/processors). Because they rely almost entirely on fillet production, they target larger pollock, found at the bottom of the water column. Reportedly, smaller fish cannot be easily utilized by fillet operations and are often made into fishmeal and oil (because discarding them is no longer an option under IR/IU). The sector's requirement for larger fish also makes it more likely that these vessels will have greater incidental catches of non-pollock species, although with the requirement that only pelagic gear may be used to harvest pollock, bycatch rates are “relatively low”, as compared to most other trawl fisheries.

Participation in Groundfish Fisheries
Four fillet catcher/processors reported landings in 1999, roughly one-fifth of the peak number of 21 in 1993. The AFA (which allows these vessels to add capacity to produce fillets) and declining quotas for the offshore sector (resulting from inshore-offshore allocations) were factors that combined to reduce the number of vessels in this category. Because of fishing season regulations in the BSAI FMPs, fillet catcher/processors operate from mid-January through March or April, and then again from July through October. All vessels reporting landings from 1991 through 1999 reported landings of all four groundfish species groups.

Groundfish Landings by Species
These vessels processed 467,323 round weight tons of groundfish in 1991. Production declined steadily from 1991 through 1999, with 90,963 round weight tons reported in 1999 (Table C-10). Pollock typically accounted for almost 90% of total tons reported. In 1999, pollock accounted for 88 of total tons. Total wholesale product value of groundfish output was $171 million in 1991, and declined steadily until 1999, when total value was $55 million. In 1999, fillets accounted for $42 million of total product value (for groundfish resources), and minced products accounted for $7 million.

Table C-10 Fillet trawl catcher/processor, 1991-1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Retained Groundfish Tons									
Number of Vessels	23	18	21	15	13	14	13	12	4
Thousands of Metric Tons	467	350	411	306	277	264	243	222	91
Reported Tons of Species Groups as a Percent of Total Groundfish									
Flatfish	15.2	21.8	12.1	12.6	8.6	6.6	11.6	2.2	1.1
Atka Mackerel (w/RSO)	6.2	8.8	8.3	2.0	1.6	2.3	1.5	2.1	0.4
Pacific cod	7.7	10.8	7.3	6.7	8.7	10.0	11.2	8.0	10.8
Pollock	70.9	58.7	72.4	78.7	81.2	81.1	75.8	87.7	87.7
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
Aleutian Islands	5.5	8.3	9.6	4.0	4.2	5.2	8.8	7.4	10.0
Bering Sea	88.6	88.1	87.7	94.7	93.4	91.3	89.5	90.5	90.0
GOA	6.0	3.5	2.7	1.2	2.4	3.5	1.8	2.1	0.0
Total Production, Product Utilization Rate, Product Value, and Value per Metric Ton of Round Weight									
Product (thousands of metric tons)	NA	70.9	83.3	57.9	49.5	53.1	47.7	44.2	20.7
Utilization Rate (%)	NA	20.3	20.3	18.9	17.9	20.1	19.6	19.9	22.8
Product Value ($Millions)	NA	171.6	165.7	125.7	128.9	137	122.1	114.9	55.2
Value per Ton ($)	NA	490.3	403.2	411.3	465.3	518.8	502.8	517.9	606.5

Notes: RSO – All rockfish species, sablefish, and ‘other’ groundfish, as defined.
NA – Data not available.
Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Head-and-Gut Trawl Catcher/Processors

Description of this Operational Category

The head-and-gut sector is the only trawl catcher/processor group that does not focus on pollock. This fleet typically targets flatfish species, such as yellowfin sole and rock sole, with primarily Atka mackerel and rockfish and Pacific cod important secondary target species. Vessels average 170 ft LOA and have an average rating of about 370 gross tons and 1,700 horsepower. Below the fishing deck is the fish processing deck, with plate freezers, where the catches are headed, gutted, cleaned, sized, and frozen into blocks, each weighing about 40 lbs. Freezer holds on the vessels can store 200 mt to 500 mt of frozen product.

Participation in Groundfish Fisheries

The number of head-and-gut catcher/processors decreased from 28 in 1992 to 24 in 1999, or about a 15% decline. With few exceptions, these vessels process all four major species groups on an annual basis. The Bering Sea is clearly the focus of these vessels' harvests, but most traditionally also participate to some extent in the Aleutian Islands, western GOA, and central GOA FMP areas. Many fewer head-and-gut catcher/processors participate in the eastern GOA. These vessels target a number of species and operate for longer periods during the fishing year, than the surimi and fillet vessels, which focus on pollock. A fishing rotation in this sector might include: Atka mackerel and pollock (for roe) in January; rock sole in February; rock sole, Pacific cod, and flatfish in March; rex sole in April; yellowfin sole and turbot in May; yellowfin sole in June; rockfish in July; and yellowfin sole and some Atka mackerel from August to December. The target fisheries are usually limited by bycatch regulations or market constraints. Only rarely are these vessels able to catch the entire TAC of target species, available to them.

Groundfish Landings by Species

Vessels in this fleet reportedly harvested 299,057 round weight tons of groundfish in 1999, 48% of which was flatfish and 33% of which was Atka mackerel (w/RSO) (Table C-11). Reported harvests in recent years ranged from 351,533 round weight tons in 1994, to 216,369 round weight tons in 1991. Fish from the Bering Sea and Aleutian Islands subareas constitute most head-and-gut activities. In 1999, approximately 63% of the reported tons were harvested in the Bering Sea FMP subarea and 26% in the Aleutian Islands subarea. The head-and-gut fleet generated a total wholesale value of $124 million in 1999, with head-and-gut products accounting for 67% (approximately $82 million) of the total.

Table C-11 Head-and-Gut Trawl Catcher/Processors, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Retained Groundfish Tons									
Number of Vessels	30	28	26	26	31	28	30	23	24
Thousands of metric tons	216	275	309	352	339	367	382	298	299
Reported Tons of Species Groups as a Percent of Total Groundfish									
Flatfish	54.5	51.8	47.8	49.6	44.9	43.8	58.0	54.6	47.9
Atka mackerel (w/RSO)	16.5	28.5	30.0	27.3	32.0	37.0	23.5	27.0	32.9
Pacific cod	11.7	8.5	9.0	8.5	11.3	8.7	8.3	10.2	9.4
Pollock	17.2	11.2	13.3	14.7	11.7	10.5	10.2	8.2	9.8
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
Aleutian Islands	9.5	14.3	23.6	22.3	27.1	34.4	18.7	22.9	26.5
Bering Sea	75.8	66.2	64.2	66.9	62.3	54.7	73.9	68.1	63.2
Western GOA	4.7	6.7	2.7	1.7	1.3	1.7	1.5	1.8	2.4
Central GOA	9.4	10.5	8.6	8.3	8.2	8.2	5.0	6.7	7.2
Eastern GOA	0.7	2.3	0.9	0.9	1.1	1.0	0.9	0.6	0.7
Total Production, Product Utilization Rate, Product Value, and Value per Metric Ton of Round Weight									
Product (thousands of metric tons)	NA	93.7	107.1	110.1	117.6	133.6	141	121.1	114.2
Utilization Rate (%)	NA	34.1	34.6	31.3	34.7	36.4	36.9	40.6	38.2
Product Value ($Millions)	NA	139.7	143.4	155.5	174.8	197.6	161.3	122.9	124.3
Value per Ton ($)	NA	508	463.8	442.4	515.2	538.1	421.9	412.4	415.5

Notes: RSO – All rockfish species, sablefish and 'other' groundfish, as defined.
NA – Data not available.
Sources: NMFS blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Pot Catcher/Processors

Description of this Operational Category

Vessels in the pot catcher/processor sector use predominantly pot gear to harvest Bering Sea and GOA groundfish, but primarily Bering Sea crab. Groundfish harvest and production are typically secondary activities. Vessels average about 135 ft LOA, have an average rating of about 400 gross tons and 1,250 horsepower, and are equipped with deck cranes for moving crab pots. Most pot vessel owners use their pot gear for harvesting groundfish. However, some owners change gear and participate in longline fisheries. These vessels typically have a processing deck and freezer holds, which enable them to process and freeze groundfish harvests.

Participation in Groundfish Fisheries

The number of pot catcher/processors participating in the groundfish fishery has varied over the past 9 years, reaching a peak of 14 vessels in 1992 and a low of 3 vessels in 1993 and 1994 (Table C-12). Their success in the crab fisheries influences the number participating in the groundfish fishery. In poor crab seasons, more vessels participate in groundfish fisheries. In recent years, the historically high prices of Pacific cod have made the groundfish fishery more attractive: in 1999, nine of these vessels processed groundfish. Pot catcher/processors tend to target Pacific cod and harvest other groundfish species as bycatch. In recent years, the number of vessels processing flatfish (eight in 1999) exceeded the number processing pollock (four in 1999), but trailed the number reporting Pacific cod and Atka mackerel (w/RSO) (nine in 1999 for both). Nearly all pot catcher/processors are active in the Bering Sea, while only one-third to two-thirds of them are active in other FMP areas (Table C-12).

Groundfish Landings by Species
Pacific cod accounts for the largest volume of species harvested, nearly 98% of groundfish harvests in some years. In 1999, pot catcher/processors reported 7,420 round weight tons of Pacific cod (98% of the total harvest), 108 round weight tons of Atka mackerel (w/RSO) (roughly 1.0% of the total), 36 round weight tons of flatfish, and 9 round weight tons of pollock. In most years, most of the harvest comes from the BSAI. In 1999, the harvest was split almost equally between the BSAI (3,560 round weight tons) and the GOA (4,014). Total wholesale product value in 1999 was $7 million, all of which came from head-and-gut products. Total product value in 1999 was higher than any other year during the period 1992–1999.

Table C-12 Pot catcher/processors, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Reported Groundfish Tons									
Number of Vessels	7	14	3	3	6	9	6	5	9
Thousands of Metric Tons	5.4	9.3	0.6	1.7	4.9	8.0	4.5	3.5	7.6
Reported Tons of Species Groups as a Percent of Total Groundfish									
Flatfish	1.1	0.1	a	a	0.4	0.8	0.7	2.2	0.5
Atka Mackerel (w/RSO)	12.8	4.5	1.1	2.7	2.1	1.7	0.9	1.1	1.4
Pacific Cod	86.1	95.4	98.7	97.3	97.5	97.4	97.7	96.6	98.0
Pollock	0.0	0.0	a	0.0	0.0	0.1	0.7	b	0.1
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
BSAI	100.0	98.9	100.0	100.0	100.0	100.0	100.0	100.0	47.0
GOA	a	1.1	0.0	a	a	0.0	0.0	a	53.0
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight									
Product (thousands of metric tons)	NA	3.8	0.3	0.7	2.2	3.7	2.2	1.5	3.6
Utilization Rate (%)	NA	40.8	52.4	43.5	45.5	46.5	48.1	42.1	47.2
Product Value ($millions)	NA	6.5	0.4	1.2	2.9	6.5	3.1	3.2	7
Value per Ton ($)	NA	701.2	700.2	726.1	603.1	810.7	693.5	901.7	926.9

Notes: [a]Number cannot be released due to confidentiality restrictions.
RSO – All rockfish species, sablefish, and 'other' groundfish, as defined.
NA – Data not available.
Sources: NMFS Blend data and NMFS Weekly Processor Report data.
Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

Longline Catchers/Processors

Description of this Operational Category
Vessels in the longline catcher/processors sector use predominantly longline gear to harvest Bering Sea and GOA groundfish resources. Vessels in this class are about the same size as head-and-gut trawl vessels and produce headed and gutted products, as well. The longline catcher/processors evolved because regulations applying to this gear type provide more fishing days than are available to other gear types. These vessels can produce relatively high-value products that compensate for the relatively low catch volumes. These vessels average just over 130 ft LOA and most are equipped with gear that enables them to bait and haul about 30,000 hooks to 40,000 hooks per day. Generally, they are not built to standards that would permit them to be loadline certified, a requirement to produce fillets.

Participation in Groundfish Fisheries
In 1992, 57 vessels were in the longline catcher/processors group; in 1999, there were 40 vessels (Table C-13). They tend to target Pacific cod, with sablefish and certain flatfish species (especially Greenland turbot) as important secondary target species. Many vessels reported harvesting all four groundfish species groups

each year from 1991 through 1999. Most harvesting activity has occurred in the Bering Sea, but these vessels operate in all FMP subareas. In 1999, 39 of the 40 active vessels reported harvests in the Bering Sea, 23 in the Aleutian Islands, 24 in western GOA, 19 in central GOA, and 10 in the eastern GOA.

Groundfish Landings by Species

In 1999, the total volume of groundfish (retained and discarded) was 122,400 mt, near the average of 125,000 mt per year for the period 1992–1999 (Table C-13). Total production in 1999 was also near the long-term average of 48,700 mt (for final product from groundfish resources). Of the total reported tons in 1999, approximately 97,500 (78% of the total) were Pacific cod and 17,000 mt (14% of the total) were Atka mackerel (w/RSO). Total wholesale product value in 1999 was approximately $103 million, $100 million of which came from head-and-gut products. Total wholesale product value in 1999 was higher than in any other year during the period 1992–1999.

Table C-13 Longline catcher/processors, 1991–1999

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999
Vessels Landing Groundfish and Reported Groundfish Tons									
Number of Vessels	39	57	53	54	48	45	45	43	40
Thousands of Metric Tons	97	128	96	110	131	123	158	134	122
Vessels Landing Groundfish and Reported Groundfish Tons									
Flatfish	3.8	2.8	8.8	3.7	4.4	5.7	5.3	7.2	4.9
ARSO	11.0	12.4	16.3	14.1	11.4	9.7	10.3	13.0	13.9
Pacific cod	82.3	82.3	72.6	79.5	81.7	82.2	81.5	77.3	78.0
Pollock	2.8	2.5	2.2	2.6	2.6	2.4	2.9	2.5	3.2
Reported Tons from FMP Subareas as a Percent of Total Groundfish									
Aleutian Islands	5.7	19.2	22.6	9.4	4.7	6.3	5.8	12.7	9.5
Bering Sea	90.5	71.3	67.1	83.6	88.5	87.5	90.3	83.3	82.8
Western GOA	1.7	5.9	6.4	3.7	5.5	4.5	3.1	3.0	5.9
Central GOA	1.4	2.6	2.9	2.7	0.9	1.3	0.5	0.7	1.5
Eastern GOA	0.7	0.9	0.9	0.6	0.5	0.4	0.2	0.3	0.3
Total Production, Product Utilization Rate, Product Value, and Value per Ton of Round Weight									
Product (thousands of metric tons)	NA	51.2	35.3	42.4	50.7	49	61.2	51.3	48.1
Utilization Rate (%)	NA	40.1	36.8	38.5	38.7	39.9	38.8	38.4	39.3
Product Value ($millions)	NA	96.8	75.3	83	89.8	93.1	93.4	110.1	102.7
Value per Ton ($)	NA	757.9	784.4	754.5	685.7	757.6	591.3	823.3	839

Notes: RSO – All rockfish species, sablefish, and 'other' groundfish, as defined.
NA – Data not available.

Sources: NMFS Blend data and NMFS Weekly Processor Report data.

Modified from Original Source: Chapter 3 - Draft Programmatic SEIS (NMFS 2001a).

1.3 Analysis of the Alternatives

Except in the specific case of differential impacts on gross revenues, attributable to each of the five primary alternatives (treated in Section 1.3.4.1), the ability within this analysis to quantitatively distinguish between the effects of the suite of SSL Protection Measure Alternatives (and options) is exceedingly limited. With the single exception noted above, the balance of the regulatory impact analysis will be primarily constrained to characterizing the nature and probable 'direction' of attributable economic and operational impacts, accruing from these alternatives.

1.3.1 Approach in this Analysis

NMFS guidance for preparation of RIRs provides that, *"At a minimum, the RIR ... should include a good qualitative discussion of the economic effects of the selected alternatives. Quantification of the effects is desirable, but the analyst needs to weigh such quantification against the significance of the issue and available studies and resources."* (NMFS, 2000(d), page 2).

Research results and data on many key topics pertaining to the current SSL action are limited. Almost no empirical data are available, for example, concerning the cost and operating structure of the several sectors of the pollock, Pacific cod, and Atka mackerel groundfish fishing industry; the linkages between changes in fishing behavior and catch per unit of effort, bycatch rates, and operational safety; or the economic characteristics and parameters of demand, both domestic and international, for the numerous primary and ancillary product forms deriving from these fisheries. Indeed, because the proposed action may require the industry to operate during times, and in areas, with which they have little historical experience, it is probable that even the industry itself, cannot fully anticipate the cost, earning, and operational impacts they may incur as they adjust to the Steller Sea Lion Protection Measures' (SSL Protection Measures) requirements, for the 2002 fishing year and beyond. By necessity, therefore, much of this analysis is qualitative, although impacts have been quantified and monetized where possible.

There are two principal parts to the analysis presented here. The first sections (1.3.2 through 1.3.6) of this analysis presents potential costs and benefits attributable to or deriving from the alternative SSL Protection Measures under consideration by NMFS and the Council. This analysis is conducted from the point of view of all citizens of the United States (i.e., what is likely to be the 'net benefit to the nation'?).

The costs and the benefits from this aspect of the proposal are, however, not homogeneously distributed across that population. Many of the costs, in particular, are highly concentrated on the groundfish fishing industry that operates in the Gulf of Alaska and in the Bering Sea and Aleutian Islands, on fishing communities dependent on that industry, and sectors of the economy which supply goods and services to, or otherwise support, this industry. Therefore, the second part of the analysis (beginning in Section 1.4 of this chapter) reviews and evaluates, to the extent practicable, distributional issues and implications of the Council's SSL Protection Measures alternatives.

The analysis in Sections 1.3.2 to 1.3.6 has been broken into four components, corresponding to different categories of SSL Protection Measure-attributable benefits and costs. These categories are:

1. Non-use and non-market benefits accruing from anticipated improvements in the ESA-status and abundance of the western Steller sea lion stock (Section 1.3.2).
2. Changes in industry costs associated with Steller sea lion recovery efforts (Section 1.3.3)
3. Costs to consumers from changes in groundfish production (Section 1.3.4)
4. Changes in fishery management costs (Section 1.3.5)

Costs and benefits from all these components of the SSL Protection Measures alternatives have been summarized in Section 1.3.6.

The distributional impacts of the SSL Protection Measures alternatives are summarized in three sections.

1. Catcher boat ex-vessel dependency (Section 1.4.1)
2. Processor gross revenue effects (Section 1.4.2)
3. Dependent communities impacts (Section 1.4.3)

1.3.2 Benefits Associated with Western Steller Sea Lion Recovery Efforts

1.3.2.1 Existence Benefits

While it is the case that no "market" (in the traditional economic sense) exists within which Steller sea lions are traded, these animals nonetheless have economic value. In general, it can be demonstrated that society places economic value on (relatively) unique environmental assets, whether or not those assets are ever directly exploited. For example, society places real (and potentially measurable) economic value on simply "knowing" that Steller sea lion populations are flourishing in their natural environment (i.e., society values their '*existence*'). Society also places economic value (among other forms) on the immediate (or optional future) opportunity to directly "use" (either in a consumptive, or non-consumptive way) the western Steller sea lion resource.

Because, in the present case, the western Steller sea lion population is a natural resource asset which is held "in common", by all citizens of the United States (some would argue, by all citizens of the world), the way society regards the stewardship and exploitation of this natural asset is fundamentally different than, say, an asset to which private property rights and ownership institutions apply. Economists define the former class of assets as "public goods". A "pure" public good has the features that: (1) no one can be prevented from 'enjoying' it, once it is produced, and (2) one person's enjoyment of the good does not detract from enjoyment by another person.

Under these conditions, there is a tendency for private markets and actions to produce too little of the good. After all, a private firm would have a hard time making a profit if it could not prevent people from 'consuming' (i.e., taking enjoyment from) the good, once produced. Moreover, from society's point of view, if one person's enjoyment of the good does not reduce another person's opportunity to enjoy it, one might not want to restrict or otherwise ration access, once produced. For these reasons, private behavior will tend to produce less of a public good than is socially optimal (e.g., private behavior will not protect endangered species sufficiently).

The absence of a traditional economic market for a public good, like species preservation and enhancement, also makes it hard for economists to place monetary values on, in this context, the proposed Steller Sea Lion Protection Measures, whether in the aggregate or with respect to any one of the suite of potential actions under consideration by the Council, within the scope of this SEIS/RIR. The term 'value' is used here in the sense used in a cost-benefit analysis (e.g., what would people be willing to give up to preserve the species). One way to estimate non-market (e.g., existence) values is by surveying people to find out what the proposed action is worth to them. This approach is termed the "contingent value" method or, alternatively, CV or CVM, and a substantial literature has developed which describes the application of this technique to the valuation of natural resource assets.

Empirical research on '*existence value*', within the broad context of natural resources, suggests that these economic values may be substantial. For example, a survey conducted for the U.S. Fish and Wildlife Service found a national existence (and option - see the next section) value associated with the recovery of grizzly bear populations in the Bitterroot ecosystem of Montana to be on the order of $40 million to $60 million a year (expressed in 1996 dollars). This was reportedly a net value, reflecting both the negative valuations of persons who were opposed to reintroduction, as well as, the positive values of those who favored reintroduction. (USFWS, pages 4-23 to 4-28).

There has been, however, no study published concerning the existence value of the western Steller sea lion resource, although one such study is reportedly underway by researchers at the University of Alaska Fairbanks. Therefore, at present, this cost-benefit analysis is unable to place a monetary value on the *'existence value'* which might be associated with one or another of the alternative proposed SSL Protection Measures included in this action.

Notwithstanding this limitation on the present analysis, Metrick and Weitzman (1998) provide one framework within which to think about the *'existence value'* of a species. They suggest, for example, that the value of efforts to preserve a species will depend on several characteristics of that species. These authors identify the following important factors:

- People may place value on a species for it own sake. The values people place on the preservation of a species change from species to species. Metrick and Weitzman provide evidence that people often place higher values on certain well-known larger animals ("charismatic megafauna"). (Op. cit., page 554).
- People may value the genetic distinctiveness of the species. Distinctiveness means the number of genes acquired since the species split off from its nearest common-ancestor. (Op. cit., page 546). For Steller sea lions, the question might be, how genetically distinct are, say, the eastern and western populations in Alaska.
- The value of efforts to preserve a species will depend on the extent to which the efforts will contribute to an increased likelihood of survival for the species.
- Finally, the value of the survival of the species will depend on the cost incurred to preserve it. (This cost is discussed in subsequent sections of this RIR.)

In one sense, through provisions of the Endangered Species Act (ESA), Congress implicitly appears to impute a very high social value (e.g., existence value) to protection and enhancement of endangered species. The ESA, for example, requires the listing and protection of endangered species without consideration of cost.[6]

While it is not possible at this time to provide an empirical point estimate of the non-use value attributable to protection (and enhancement) of the western Steller stock, it is implicit in the SSL Protection Measures proposal that each of the alternatives to the "status quo" (i.e., Alternative 1) would yield an incremental benefit in this regard over the baseline condition. This is so, because: (1) the status quo alternative was determined in the 2000 Biological Opinion to result in "jeopardy" for the western Steller stock, and (2) each of the alternatives to the status quo have been designed with the expectation (on the part of their authors) that

[6]The ESA does contain provisions for a cabinet-level "endangered species committee" that may override the provisions of an RPA, if it determines that the action will be too costly. However, this committee has not been convened in the case of the western Steller sea lion. Subsequent to a listing decision, the ESA contains provisions allowing a consideration of costs, for example, in the designation of critical habitat for a listed species. Recovery plans may also include estimates of the costs to implement the measures (Huppert).

they provide "at least" the minimum necessary protection to the SSL to allow the alternative to meet the "no jeopardy" test. That is, the authors and/or proponents of each alternative assert that their alternative to the status quo provides a management framework within which these fisheries may be prosecuted, without negatively impacting the western Steller resource or adversely modifying its critical habitat.

To the extent that each does meet this threshold expectation, each is '*preferred*' to the status quo alternative, on this criterion. It is not, however, possible, with the information available, to 'rank order' Alternatives 2 through 5, relative to one another, on the basis of their respective potential to enhance non-use value. That is, while it is (theoretically) possible to project how each alternative may affect the future abundance, and even rate of recovery, of the western stock of Steller sea lions, how those variable rates and total numbers might actually be reflected in the "willingness-to-pay" bids for each alterative, by those holding non-use values for these animals, cannot be directly imputed from the available information.

Table C-14 Ranking relative to non-use (e.g., existence)

Alternative 1 (No Action)	**Alternative 2** (Low and Slow)	**Alternative 3** (Restricted and Closed Areas)	**Alternative 4** (Area and Fishery Specific)	**Alternative 5** (CH Catch Limit)
Fails to meet minimum jeopardy threshold	Expected to meet minimum jeopardy threshold	Expected to meet minimum jeopardy threshold	Expected to meet minimum jeopardy threshold	Expected to meet minimum jeopardy threshold
5th	1st	1st	1st	1st

1.3.2.2 Use Benefits

Existence (and bequest) value is often referred to as a "non-use" value, because it does not depend on (actual or even potential) interaction between the person holding the value and the resource being valued. Persons may also place a value on the actual direct exploitation of the resource; here, the western Steller sea lion (including the 'option' to use the resource at some future point in time).

Two classes of such "use" values are identified for the western Steller sea lion stock:

- Subsistence harvest values (non-market use)
- Eco-tourism values (non-consumptive use)

Subsistence

The Subsistence Division of the Alaska Department of Fish and Game (ADF&G) has surveyed subsistence hunters about their Steller sea lion harvests since 1992. During that period, statewide subsistence harvests have reportedly dropped, from an estimated 549 animals in 1992, to an estimated 178 animals in 1998. (More recent survey information is not available at this time from the ADF&G.)

Subsistence analysts at ADF&G suggest that the decline in Steller sea lion harvest is connected to, (a) increased scarcity and consequent reductions in subsistence harvest success per unit of effort, and (b) conservation related concerns about the health of Steller populations among subsistence hunters. (Wolfe, 1999. Pages 64-69).

As noted above, an estimated 178 sea lions were harvested statewide in 1998 (with a 95% confidence interval, the range for the estimate is 137 to 257 animals). Of this estimated total (178 animals) *taken* for subsistence, 131 sea lions were actually harvested, while 47 were struck and lost. The estimated regional distribution of these *takes* was:

- Pribilof Islands: 78 sea lions (about 44% of the state take) [likely, western SSL stock]
- Aleutian Islands: 37 sea lions (about 21% of the state take) [likely, western SSL stock]
- North Pacific Rim: 29 sea lions (16%) [likely, western SSL stock]
- Kodiak Islands: 18 sea lions (10%) [western stock, w/likelihood of some from eastern stock]
- South Alaska Peninsula: 9 sea lions (about 5%) [Sand Point/Shumagins/Chignik, western stock]
- Southeast Alaska: 8 sea lions (about 4%) [eastern SSL stock, w/likelihood of some western][7]

Wolfe describes sea lion hunting as a "relatively specialized" activity among Alaska subsistence households. In 1998, out of 2,569 subsistence households statewide, only 111 (or approximately 4%) hunted for sea lions. This pattern was similar to that seen in 1992, at the start of the series of surveys. In 1992, out of 3,712 subsistence households, only 199 (or just over 5%) hunted sea lions. As these data, in the list above suggest, subsistence household participation in sea lion hunting varies considerably between different regions of the state. At St. Paul, in the Pribilof Islands, an estimated 23.3% of the Native households hunted sea lions. (Wolfe, 1999, pages 34, 37, C-97.)

Actual "use-benefit" from the sea lion harvest is believed to be more widespread than these hunting figures suggest. As Wolfe indicates, "Highly-productive hunters commonly distributed marine mammal products among a wider range of households, through non-commercial systems of sharing and trade." (Wolf, 1999, page 37) A sense of the wider involvement of households in the sea lion harvest, and of the variation of involvement among communities, can be conveyed by community-specific estimates of the percentages of households receiving and using sea lions.

- In St. Paul (Pribilofs), 23.3% of the households hunted sea lions, 13.7% of the households harvested sea lions, 10.9% of the households gave away sea lions, 60.5% of the households received sea lions, and 63.5% of the households used sea lions. (Wolfe, 1999, page C-97).
- At Atka in the Aleutians, 41.2% of the households hunted sea lions, 23.5% of the households harvested sea lions, 47.1% of the households gave away sea lions, and 100% of the households both received and used sea lions. It is unclear from Wolfe how more households gave away sea lions than harvested them. Possibly households passed on sea lion products that they received. Possibly, the figures also represent gifts and trades between communities. (Wolfe, 1999, C-89).
- At False Pass, no subsistence households harvested or were otherwise involved in subsistence seas lion hunting activity in 1998. (Wolfe, 1999, C-77)
- At Kodiak City, 10% of subsistence households hunted sea lions in 1998, none harvested sea lions, 10% gave away sea lions, and 20% received and used sea lions. (Wolfe, 1999, page C-61) These figures suggest trade between communities.

Changes in the abundance and availability of Steller sea lions to subsistence communities have economic implications. First, declining Steller stocks can reasonably be assumed to increase costs of the actual

[7] Lowell Fritz, "Personal Communication," AFSC, 7600 Sand Point Way NE, Seattle, WA 98115, March 2001. Hypothesized SSL stock affiliation.

subsistence harvest. Wolfe suggests that reductions in the sea lion population have meant that successful harvesters had to invest more time and cash in the hunts. Time and money, of course, are limited, valuable resources and the need to use more of each would reduce the net value of the sea lions to the persons harvesting them, all else equal.

A second effect of reductions in Steller sea lion abundance is, of course, that fewer sea lions are harvested, in total. The resulting reductions in food stuffs, and other products derived for sea lions, would have to be made up in some way. It is not clear from the available data the extent to which other subsistence activities could be substituted for hunting sea lions. However, even if substitution is possible, the fact that sea lion hunting would have been *'preferred'*, suggests that there is a welfare loss attributable to the reduced harvests and that there would be welfare gains if the harvests again increased.

These impacts cannot be monetized with the information available. If they could be monetized, the actual aggregate nominal dollar value might appear relatively small, because of the modest population size involved. However, the broader national community may well have an interest in preserving subsistence traditions and communities. Such an interest may be inferred from the superior ranking "subsistence-use" has in Federal (and State of Alaska) statutes, relative to "commercial" or "recreational use", when allocating access to scarce fish and game resources, as well as the importance attached to maintaining cultural diversity within our society. If these interests could be measured empirically, the aggregate dollar value attached to subsistence harvests might increase considerably. The same tools used to monetize non-market non-use values of the Steller sea lion stocks could be used for this purpose. No research on this issue, however, is currently available.

Because each (and every one) of the proposed alternatives to the 'status quo' is (are) assumed to provide essentially comparable protection for the Steller sea lions, and their critical habitat, each would be expected to yield a potential positive benefit stream to subsistence users, under provisions of the proposed action. Nonetheless, if as suggested, "abundance" is directly correlated with subsistence value, based upon the expected rate of change (i.e., rate of improvement in abundance) in the western Steller sea lion stock, the alternatives rank (ordinally) as follows, on this criterion:[8]

Table C-15 Ranking relative to non-market use (i.e., subsistence)

Alternative 1 (No Action)	**Alternative 2** (Low and Slow)	**Alternative 3** (Restricted and Closed Areas)	**Alternative 4** (Area and Fishery Specific)	**Alternative 5** (CH Catch limit)
Expected to fail to achieve minimum jeopardy threshold; no improvement in SSL stock	Expected to result in most rapid rate of improvement in SSL stock among all alternatives	Expected rate of improvement in SSL stock below that of alternatives 2 & 4	Expected rate of improvement in SSL stock below only that of alternative 2	Expected to result in slowest rate of improvement in SSL stock among alternatives to the status quo
5th	1st	3rd	2nd	4th

[8]According to ordinal ranking, by NMFS Protected Resources, of the competing alternatives on the basis of expected 'rate of change' in SSL stock abundance.

Eco-tourism

Persons interested in the operation of eco-tourism firms, as well as persons interested in participating in eco-tourism, themselves, may place an economic value on (as well as maintaining the *option* for future) use of the western Steller sea lion resource for viewing, photography, or other non-consumptive uses. The difficulties in estimating these economic values are similar to those for estimating non-use (e.g., *existence)* values. No research is available on the size of these potential values for the western Steller sea lion stock, although it is virtually certain that such values do exist and that they are "positive". Indeed, eco-tourism may represent one of the more obvious areas of potential economic growth for communities in these relatively remote and isolated regions.

As in the case of 'subsistence use', because each (and every one) of the proposed alternatives to the 'status quo' is (are) assumed to provide essentially comparable protection for the Steller sea lions, and their critical habitat (i.e., result in a 'no jeopardy' determination), each would be expected to yield a positive benefit stream to eco-tourism users, under provisions of the proposed action. Assuming that "abundance" is directly correlated with non-consumptive use value, based upon the expected rate of change (i.e., rate of improvement in abundance) in the western Steller sea lion stock, the alternatives likely rank (ordinally) as follows, on this criterion:

Table C-16 Ranking relative to non-consumptive Use (e.g., eco-tourism)

Alternative 1 (No Action)	**Alternative 2** (Low and Slow)	**Alternative 3** (Restricted and Closed Areas)	**Alternative 4** (Area and Fishery Specific)	**Alternative 5** (CH Catch Limit)
Expected to fail to achieve minimum jeopardy threshold; no improvement in SSL stock	Expected to result in most rapid rate of improvement in SSL stock among all alternatives	Expected rate of improvement in SSL stock below that of alternatives 2 & 4	Expected rate of improvement in SSL stock below only that of alternative 2	Expected to result in slowest rate of improvement in SSL stock among alternatives to status quo
5th	1st	3rd	2nd	4th

1.3.3 Industry costs associated with Steller sea lion recovery efforts

1.3.3.1 Industry revenue and aggregate output impacts

Revenues from seafood production may change for several reasons, due to provisions of any one of the suite of proposed alternative SSL Protection Measure actions. These would include:

- if fewer fish are harvested, the price per unit of the fish which are caught and delivered to market may increase. A price increase would tend to increase revenue per unit catch.
- if fewer fish are harvested, fewer can be sold; this may reduce total revenues.
- if fewer fish are supplied to the market by the industry, secondary processors, marketers, and consumers, may adapt to the reduced supply by 'substituting' other products (or sources of supply), and markets could be permanently lost.

Each of these factors is examined in greater detail below.

Harvests and fish prices

The economic "law of supply and demand" suggests that (assuming all other factors are held constant) if fewer units of a good or service are supplied (in this context, if fewer fish are harvested in the commercial fisheries targeting pollock, Pacific cod, and Atka mackerel), their individual unit price would be expected to rise. This means that, within the limits of this model, fishermen should receive more for each unit of fish they continue to deliver to the market, all else equal.

The increase in price that would actually occur would depend on, among other things, how responsive the price consumers are willing to pay is to changes in the quantity of fish supplied.[9] Very little empirical information is available, at this time, as to the responsiveness of demand for these species and product forms, although some preliminary analysis is reported in the appendix to this report, "Market Analysis of Alaska Groundfish Fisheries."

Alaska pollock are processed into a wide variety of product forms sold in different markets around the world. The most valuable of these are surimi, fillets, and roe. Whether the per unit price of pollock will rise in response to a contraction in supply depends upon the combined effect on these markets.

Surimi from Alaska is sold primarily to markets in Japan, and the United States is by far the leading country providing pollock surimi to Japanese markets. Furthermore, surimi made from pollock is considered to be superior to most, if not all, other surimi: there are no close substitutes (at least for the 'premium' grades). Therefore, a change in quantity of pollock surimi supplied would result in a noticeable change in per unit cost.

The almost identical story can be reported for pollock roe. Japan is the primary market destination and Alaska-based pollock roe dominates other supplies in Japan. There are no close substitutes for pollock roe in the marketplace. Thus, a change in the quantity of pollock roe supplied would result in a change in per unit cost.

The fillet market is quite different from surimi and roe. Nearly all of the fillets (deep-skin and other forms) produced from pollock, end up in domestic markets, and the demand in the United States far exceeds the current supply of fillets. But the domestic fillet market is fairly competitive in terms of product form (IQF, block, and twice-frozen), supplying country (China and Russia play major roles), and fillets from other species, including, for example, hakes and hoki. As a result, it would be expected that the per unit price for pollock fillets will rise only if there were a large change in the amount of pollock fillets supplied to the marketplace.

These three product forms, taken together, account for more than 90% of the product value from this fishery (these fisheries). The net result, in terms of the price of raw pollock, is the expectation of a per unit price increase, as the quantity is reduced.

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[9] In other words, are pollock, Pacific cod, and Atka mackerel products "must have" items, so that consumers will bid up prices in response to reduced supply? Or, are there lots of close substitutes in the marketplace for these items, so that consumers may readily substitute away from these species, as supplies drop, without bidding up prices to any great extent? Consumers are often assumed to be less responsive in the short run than they are in the longer term. That is, the price increase caused by a reduction in production may be larger in the first year or so and then decline through time.

Pacific cod also enters an international market, but much of the product stays in the United States. More than half of the harvested amount is processed as H&G and sold to China, Japan, and in Europe. Some of that sold to China is reprocessed and returns to the United States as "twice-frozen" blocks. Fillets, as IQF and block, represent the next largest product form (and about a third of the value), and are sold in domestic markets to fancy (e.g., 'white tablecloth') and family restaurants, institutions, and retail fish markets. As Atlantic cod stocks and landings in the United States, Canada, and the North Atlantic fluctuated during the last decades, Pacific cod effectively filled the product supply void. However, the United States continues to import Atlantic cod (from Iceland, Canada, and Norway), serving a primarily 'east coast' market.

What this implies about Pacific cod is that the product forms are diverse, and serve as an effective substitute for Atlantic cod, whose stocks (and therefore supplies to the market) have been very volatile over the preceding decades, rising and falling very dramatically. But markets are well-established, both domestically and internationally, for Atlantic cod. If the quantity of Pacific cod is reduced, the per unit price may roughly hold steady (due to the very close substitutional relationship between Atlantic and Pacific species in the marketplace), or rise slightly, depending largely on world supplies and stock conditions of Atlantic cod, at the time.

Atka Mackerel is usually processed into H&G, almost entirely exported, with nearly all of it going to either Japan or South Korea. It is a unique and popular product in those countries, with few substitutes. If the supply is reduced, the per unit price will very likely rise. (For greater detail on the 'market dynamics' of these species, see Appendix D).

Increased revenue accruing from such a 'per unit' price rise would be a *benefit* to primary producers (e.g., fishermen), offsetting some of the costs they would be expected to incur through adoption of any one of the proposed SSL Protection Measures alternatives to the 'status quo'.

It should be pointed out, however, that to the extent that these fishery products are consumed in the United States, this producer benefit would be completely offset by a reduction in consumer welfare (i.e., surpluses) from the increase in price. That is, the benefit to the industry would simply be the result of a transfer from consumers. Thus, under these conditions, this hypothesized supply-induced price increase would create no "net" benefits, that could be revealed in a cost-benefit analysis, for domestically consumed fish.

Alternatively, to the extent that these fish are exported and consumed outside of the United States, any supply induced price increase would create an attributable net benefit improvement, from a cost/benefit perspective. This is because the price increase would accrue, in the form of increased revenues, to U.S. producers, while the loss in consumer welfare would be imposed on citizens of other countries.[10] Such changes would (all else equal) result in a 'net' benefit to the nation (e.g., increases in producer surpluses, with no equivalent attributable reduction in U.S. consumer surpluses).

The remainder of this section will examine the impact on industry gross revenues attributable to fewer fish being harvested (aside from the price impact), including the potential risk of loss of market share.

Revenue changes due solely to the volume of fish (excluding price changes)

[10] Under OMB guidelines, changes in consumer (and for that matter, producer) surpluses, attributable to a proposed action, which accrue to persons (or firms) from other than the United States, are excluded from the benefit and cost calculations performed in an impact assessment.

Accurate estimates of the change in gross revenues from reductions in production associated with the SSL Protection Measure alternatives require information on: (1) the volume of production coming from restricted fishing areas for each of the fleet sectors, (2) the extent to which each fleet sector would redirect its operations into other fishing areas, and (3) the productivity of the fleet sectors in the new areas. Currently, it is only possible to estimate the first of these (i.e., the volumes of production coming from areas that will no longer be available to fishermen under each of the alternatives).

However, estimates of the volumes of production coming from fishing areas restricted by the SSL Protection Measures, under the competing alternatives, combined with data on ex-vessel and/or first wholesale prices, will allow estimates of the gross revenues for each fleet sector that are potentially placed "at risk", under the different alternatives. These estimates can provide a crude measure of the potential economic impact of the alternatives on different fleet sectors. Moreover, if it is assumed that harvest foreclosed to a fleet sector in one area, by an alternative, cannot be made up elsewhere by that fleet sector, the "at risk" estimate becomes an approximation of the 'worst case' estimate of foregone gross revenues attributable to the proposed action.

It is also possible to take a further step. Having estimated the maximum revenues that might be lost, for each fleet segment, on the assumption that the fleet is unable to make up impacted harvests by fishing in other areas, it is possible to gradually relax that assumption. That is, the assumption could be relaxed so that the fleet segment is assumed to be able to make up, say, 10% of the harvest elsewhere; or 20% elsewhere, etc. This is done without specifying where else the fleet segment might operate (or at what cost), except to assume that the effort is redistributed to remaining open areas, during remaining open periods. With this information available for each fleet segment, readers may apply their own assumptions about the extent to which each fleet segment would be able to "make up" its catch elsewhere, under the differing temporal and geographic constraints and limitations provided across competing SSL Protection Measure alternatives, thus producing their own estimates of the gross revenues that might be foregone, under each. Most of the discussion relevant to this approach can be found in Section 1.4.2, which deals with the differential impacts of the alternatives on the respective components of the industry gross revenues.

The gross revenues "at risk" were estimated using information about: (1) projected fleet segment TACs for the 2001 fishing year, assuming the provisions of each alternative 'had been' in place in that year; (2) the actual proportions of harvest of different allocations, by different groups of vessels [e.g., vessel length, gear-type, area, processing mode, target species], based upon historical catch patterns for 1999; (3) information about the proportions of the sea surface area closed by the respective SSL Protection Measure alternatives in different management areas; (4) estimated product mix and first wholesale product values for the most recent year that these data are available.

Future allocations were projected on the basis of known harvests, information on allocations contained in the 2001 specifications, and informed judgements by NMFS in-season management staff. In many cases, TAC specification projections had to be allocated among fleet sectors. For example, the Gulf pollock and Pacific cod allocations in specifications are for inshore and offshore fleet sectors, only. These had to be further subdivided among the different gear and vessel size categories. These subdivisions were made on the basis of historical catch records of the proportions of the harvest taken by the different vessel groupings.

To move from the TAC specifications, by species, to estimates of the actual harvest by species, it was necessary to determine what proportion of the specification (of each target species) was potentially "at risk", based upon temporal and geographic dispersion provisions of each SSL Protection Measure alternatives. To do this, landings data for each fleet segment were estimated for each State of Alaska statistical area. GIS techniques were then employed to determine what proportion of the physical surface area of each of these statistical areas had restrictions placed on which target fishery, under each of the alternatives. The landings from each of these statistical areas were then prorated to "restricted" or "unrestricted" status in proportion to the physical surface area of the statistical areas that were specified as restricted or unrestricted. This was done for the unique restrictions appropriate to each of the five SSL Protection Measures alternatives. The total landings restricted under each of the alternatives could then be estimated by summing restricted landings for each statistical area, for each relevant vessel group, gear type, target species, processing mode, geographic area, and fishing period.

Finally, the harvest tonnages "at risk" were valued using first wholesale product value from the2000 fishing year. First wholesale values are the revenues received by the first level of processors (i.e., inshore plants receiving deliveries from catcher vessels, catcher/processors, and motherships). They are not the same as ex-vessel prices. They were estimated by dividing the total wholesale value of production for a species, by estimated deliveries of each species of fish, to yield a "round weight per ton of catch" equivalent value. Implicit in this procedure is the assumption that changes in harvest levels will not change the composition of product output from the plant (i.e., product mix, for example, fillets, surimi, H&G, etc.) at the first wholesale level.

There are many ways in which the alternatives may lead to reductions in industry revenues. The most important ways are likely to be:

- Reductions in the overall TACs due to specific limits or global control rules
- Changes in the timing of TAC apportionment releases to the fishing operations. These may force fishing to take place when the fish are less valuable and/or less available
- Closure of critical habitat to fishing by specified classes of vessels
- Limits placed on harvests from critical habitat areas that remain open to fishing
- Closure of fisheries in areas with TACs that are too small to manage safely

The analysis of the gross revenue impacts of the alternatives in this section is conducted in terms of several gross revenue categories. The first is the potential maximum gross revenues that could be generated by the alternative. This is simply the gross revenues that would be generated by the TACs associated with an alternative, if the entire TACs could be caught. These may differ between the alternatives if the TACs differ, or if constraints in the alternatives affect the timing of the harvests and, as a result, the price that would be received for the harvest.

The second general category of gross revenues is gross revenues "at risk," under the different alternatives. Various restrictions in the alternatives can prevent fleets from harvesting fish at accustomed times and places. The affected fishing fleets may or may not be able to make up the fish and the gross revenues that are lost, because of these restrictions, by fishing elsewhere. Because different fleets may potentially be able to recover some or all of these gross revenues, these catches cannot be described as "lost." They have been described here as "at risk." Only if it is assumed that harvest foreclosed to a fleet sector in one area by an alternative cannot be made up elsewhere by that fleet sector, will "at risk" revenues be an estimate of lost gross revenues.

Accurate estimates of the abilities of fleets to make up a reduction in harvests in one area by fishing in another require information on : (1) the volume of production impacted by the various restrictions, (2) the extent to which each fleet sector would redirect its operations into other fishing areas, and (3) the productivity of the fleet sectors in the new areas. Currently it is only possible to estimate the first of these, i.e., the reductions in the TACs and the volumes of production coming from areas that will no longer be available to fishermen under each of the alternatives.

Revenues are placed "at risk" in three ways, corresponding to three different kinds of limitations the alternatives impose on fishing in critical habitat. An alternative may absolutely prohibit fishing activity for pollock, Pacific cod, and Atka mackerel, by a vessel class within an area of critical habitat. In these instances the critical habitat is referred to here as "closed" and the revenues that might have been generated by fishing in that closed critical habitat are placed at risk.

An alternative may also permit fishing for these species by a vessel class within a portion of critical habitat, but *limit* the amount that may be taken. If, based upon historical use patterns, that fleet would otherwise have been expected to harvest a larger amount than provided for under the restricted CH limit, the amount over the limit is assumed to be placed "at risk", in this "restricted open" critical habitat.

Finally, one alternative (i.e., Alternative 2) absolutely prohibits all trawl fishing in critical habitat, whether the target is pollock, Pacific cod, or Atka mackerel (the focus of the other provisions), or whether it is some other groundfish species or species group, e.g., rocksole, rockfish. In this case, the catch and revenues "at risk" accrue to a potentially much broader segment of the domestic groundfish fishing industry operating off Alaska, and well may impact employers and employees, dependent communities and families which are, by-in-large, not effected by the somewhat more narrowly focused provisions of the other alternatives (i.e., those which limit regulations to pollock, Pacific cod, and/or Atka mackerel target fisheries).

As noted above, revenues "at risk" are only foregone if a fishing fleet is unable to modify its operation to accommodate the imposed limits and, thus, cannot make up displaced catches elsewhere (either in remaining open fishing areas or during alternative open fishing periods). Having estimated the maximum revenues that might be lost, for each fleet segment, on the assumption that the fleet is unable to make up impacted harvests, it is possible to incrementally relax this assumption and assess the effects. Because the 'model' is linear in its parameters, evaluating an alternative assumption about the total foregone catch is straight forward. For example, if one assumes that a given fleet segment is able to make up 10% of the harvest elsewhere, the estimated "at risk" gross revenue impact, reported in the table below, would be multiplied by 0.90; if the assumption is that, say, 20% is made up elsewhere, the total is multiplied by a factor of 0.80, and so forth. This is done without specifying where (or when) else the fleet segment might operate (or at what cost). With this information available for each fleet segment, the reader is able to apply his or her own assumptions about the extent to which each fleet segment would be able to "make up" its catch elsewhere, thus producing their own estimates of the gross revenues that might be foregone, under each alternative. Most of the discussion relevant to this approach can be found in Section 1.4.2, which deals with the different ways individual fleet sectors may be affected by each of the alternatives.

The changes in gross revenue, attributable to each of the SSL Protection Measure alternatives were estimated in the following manner. TACs were estimated for each management area and were divided among the different fleet segments (e.g., catcher vessels under 60 feet using fixed gear, AFA catcher/processors) within the management area, on the basis of historical catch and/or specifications. The percentage of the harvest by each fleet segment coming from within an alternative's open or closed critical habitat was determined on the basis of historical information. The fleet segment share in the management area was then multiplied by this percentage to determine how much the fleet segment might lose due to each alternative's respective 'open' and 'closed' critical habitat restrictions. Although the basic approach is simple, a mass of details add complexity. These details are discussed below under the following headings:

- Estimating the TACs
- Gross revenue reductions associated with the TACs
- Movement of TAC within the year
- Allocating an area TAC among vessel and gear classes

- Defining a base year
- Revenues “at risk”in ‘open’ critical habitat
- Revenues “at risk” in ‘closed’ critical habitat
- Prices used in the analysis

Estimating the TACs: TACs were estimated using information on allowable biological catches and the distribution of biomass in 2001. That is, the TACs associated with each alternative are estimates of the TACs that would have been in place in 2001, had the subject alternative been adopted. The year 2001 was chosen because it is the most recent year for which reasonably complete information is available.

Gross revenue reductions associated with the TACs: Overall reductions in fish TACs are an important component of many of the alternatives. They play a very important role, for example, in Alternative #2, “Low and Slow.” Reductions in TACs represent an absolute diminution in the fish that fishing operations have available to them. That is, reduced TAC amounts mean fishing operations cannot make up foregone harvests by fishing elsewhere during that year. In this sense, the revenues associated with these fish are not simply placed “at risk,” they are completely “lost”.

The analysis accounts for this source of lost revenues by estimating the first wholesale value of the allowable TACs under each alternative and treating these as a maximum potential amount of first wholesale revenues for the fishing operations, associated with that particular alternative. Comparison of these ‘maximum” potential revenues, across alternatives, will indicate the unique impact of the changes in TAC between the alternatives. (The choice of the prices used to “monetize” the TACs is discussed below.)

Movement of TAC within the year: One structural subtlety, associated with the TAC issue, is the use of quarterly, biannual, or other TAC release/apportionment arrangements within the different alternatives to limit the amount of fish that may be taken in any given period of the year. Because these arrangements are often associated with shifts in TAC, that allow more fish to be taken during an alternative part of the year, the effect is to “move” the harvest of fish from one period to another. Because the value of fish can change substantially over the course of the year, this movement of harvest within the fishing year can affect gross revenues - even if the overall annual TAC remains unchanged.

There are a large number of complex seasonal arrangements incorporated into the different alternatives. In order to make evaluation of the alternatives comparable (and make the analytical problem tractable), the fishing year was treated as if it were divided into two parts. One part is assumed to begin at the start of January (correctly reflecting current regulations on ‘official’ opening dates, by fishery) and runs until June 15. The other part begins on June 15 and ran until the end of the year (again, as provided for in current regulation). June 15 was chosen because it was about mid-year, and many of the seasons in the alternatives begin or end on or about that date.

TACs specified for seasons which fall (predominately or completely) before June 15, were assigned to the first half of the year, while TACs specified for seasons after that date were assigned to the second half, for modeling purposes. All the parameters for calculating the revenues placed “at risk” by closed critical habitat restrictions and open critical habitat limits were prepared separately for the first and the second half of the year. Average first wholesale prices were likewise estimated separately for the first and second half of the year (i.e., to appropriately reflect product mix and value differentials, such as recovery of roe in the pollock and Pacific cod target fisheries).

In this way, the model was run twice for each alternative - once for the first half of the year and once for the second half. This allowed the model to pick up the impact of a shift of TAC apportionment from the first to the second half of the year. To the extent that the movement of fish from the first half of the year to the second led to lower prices received for the product (because of the loss of revenues from a change in product mix) this is reflected in the estimated gross revenues. The model lacks the subtlety to pick up price impacts associated with movements of fish between seasons within the first or second half of the year. For example, a forced movement of pollock harvest from the first to the second *quarter* of the year may reduce the value of the fish, because the end of the roe fishery would take place before June 15. This would not be reflected in the model. For this reason, the model, with its current bifurcated seasonal structure, probably understates (to an unknown degree) the revenue losses associated with those alternatives which provide for seasonal rearrangement of harvests within the first or second halves of the fishing year.

Allocating an area TAC among vessel and gear classes: Many different classes of vessels harvest Atka mackerel, pollock, and Pacific cod from the various management areas regulated under this proposed action. It was important to examine the economic and operational impacts on the individual vessel classes, for three reasons. First, the classes have very different activity patterns. They fish in different ways, on different stocks, in different area, at different times. It is necessary, therefore, to take explicit account of these differences in evaluating the impacts of the provisions in each of the alternatives. An important way this issue manifests itself in this analysis is through the different levels of historical activity, inside critical habitat, reported for each target fishery, by the different fleet segments. Because each historically differs in their CH fishing behavior, a provision restricting activity in critical habitat may have differential impacts on different fleets.

Second, the gear classes (including processing modes) produce different products, even when they are harvesting the same species. Thus, the first wholesale prices received per metric ton of retained harvest may differ, depending on the vessel and gear class used to harvest the fish. These price differences will affect the estimated gross revenue impacts of the various alternatives.

Third, those associated with each of the different fleet sectors will be interested in the particular impacts of the various alternatives on themselves. Although this section of the RIR focuses on overall gross revenue impacts - consistent with its intention to provide a cost-benefit analysis from the point of view of the nation as a whole - Section 1.4.2, “Gross revenues effects” summarizes what has been learned about the respective impacts of the suite of SSL Protection Measure alternatives on the different components of the industry.
A TAC for an area and a half of the year was allocated among the gear groups on the basis of allocations laid out in the specifications, or on the basis of historical patterns of landings. Pollock and Atka mackerel were primarily allocated among gear groups using the first criterion, Pacific cod was primarily allocated using the second criterion.

Defining a base year: All the alternatives are evaluated by looking at the implications they would have had for harvesting activity in 1999, had they been in place in that year. For each alternative and each management area, GIS tools were used to estimate the amount of harvest that would have come from open critical habitat and from closed critical habitat, had the alternative been in place in 1999.

A large number of possible historical periods could have been used as the “base.” The year 1999 was chosen because: (1) a complete database on historical catch that incorporated retained harvests by all groundfish vessel classes was available for the year; (2) historical catch and participation patterns were not (potentially) ‘distorted’ by the Federal Court’s CH trawling injunction, imposed during the second half of the 2000 fishing year; (3) the BSAI pollock fishery reflects the fleet allocations of the AFA, and the BSAI catcher/processors’ activity patterns reflect early AFA experience.

Revenues "at risk" in 'closed' critical habitat: To move from the TAC specifications, by species, to estimates of the actual harvest, by species, it was necessary to determine what proportion of the specifications was "at risk" in closed critical habitat, for each of the alternatives. To do this, landings data for each fleet segment were estimated for each State of Alaska statistical area. GIS techniques were then used to determine what proportion of the physical surface area of each of these statistical areas had fishing restrictions, under each of the alternatives. The landings from each of these statistical areas were then prorated to closed critical habitat and other areas in proportion to the physical surface area of the statistical areas that were restricted and unrestricted. (Atka mackerel fishing in the Aleutians was prorated inside and outside of critical habitat on the basis of observer reports; not on the "surface area" approach described here..) This was done for the unique restrictions appropriate to each of the alternatives. The total landings restricted under each of the alternatives could then be estimated by summing restricted landings for each statistical area.

Revenues "at risk" in 'open' critical habitat: Not all critical habitat is closed. Under provisions of some of the alternatives, critical habitat can remain open to fishing. In these cases, there are, however, limits on the amount of fish that may be taken from the critical habitat zone. Restrictions on open critical habitat are important parts of Alternatives 3 and 5. They also occur in more limited circumstances in other alternatives; for example, Alternative 1 has limits on Atka mackerel harvests from critical habitat in Aleutian Islands districts.

These limits have the potential to restrict traditional fishing activity within open critical habitat, thereby placing revenues "at risk." Revenues placed "at risk" in this way are functionally similar to those placed at risk by outright closure of critical habitat. That is, they would be lost, unless the fishing operations were able to make them up by changing their fishing patterns to fish in other, open, areas. When an alternative allows fishing in critical habitat, subject to fishing limits, it is necessary to estimate the amount of fish harvest that might be precluded within critical habitat by the limit. Estimates of projected harvests in the absence of the limits are prepared on the basis of historical fishing patterns and overall management area TACS, and these are compared to the landings limits appropriate to the open critical habitat within the management area. If the projected harvest is greater than the limit imposed in the alternative, the difference is treated as harvest and revenues placed "at risk" by the proposed action.

Prices used in the analysis: All harvest tonnages were valued using first wholesale prices for 2000. The first wholesale prices were estimated by dividing the total wholesale value of production for a species by estimated deliveries of each species of fish to yield a "round weight per ton of catch" equivalent value. These values were calculated separately for the first and second half of the year to account for seasonal product mix variation (e.g., roe). First wholesale prices are the prices received by the first level of inshore processors, or by the catcher/processors and motherships. They reflect the 'value added' by the initial processor of the raw catch. They are not, therefore, the same as ex-vessel prices.

The wholesale values were obtained from State of Alaska Commercial Operators' Annual Reports (COAR reports). Implicit in this procedure is the assumption that changes in harvest levels will not change the composition of products (fillets, surimi, etc.) at the first wholesale level. The first wholesale values used in this analysis are summarized in Table C-17.

Table C-17 Value per round metric ton of retained catch by species, vessel type, gear (Pacific cod only) and area (in dollars)

Species	Vessel type and gear	January-June 2000		July-December 2000	
		BSAI	GOA	BSAI	GOA
Atka Mackerel	Catcher/Processor	474.3		480.7	470.0
	Catcher Vessel	1101.9			
Pacific Cod	Longline Catcher/Processor	1177.4	1245.3	1293.5	
	Pot Catcher/Processor	1345.5	1184.1		
	Trawl Catcher/Processor	1148.8	1367.6	1055.0	1045.4
	Catcher Vessel	1187.8	1517.3	575.3	1351.9
Pollock	AFA Catcher/Processor	1062.3		454.0	
	non-AFA Catcher/Processor	671.3	389.2	343.3	261.2
	Catcher Vessel	893.4	745.5	577.3	388.0

Notes: Values were generated by dividing the total processed-product value of the catch by the total round weight of retained catch. Product values were generated using 2000 COAR prices. Weight data are from blend estimates. Value data are from weekly and annual processor reports.
Source: National Marine Fisheries Service. REFM. Sand Point, Seattle, WA.

Anecdotal information suggests groundfish prices have trended upward, perhaps sharply, since 2000, especially for Pacific cod and pollock (although at differing rates). Other anecdotal information suggests that the approach to estimating prices, used here, tends to understate the revenues generated in the BSAI "headed and gutted" (H&G) trawl fleet. If this latter assertion is correct it would particularly affect the Atka mackerel revenue estimates, included in this report. Nonetheless, the analysis reflects the best "official" data on price and value currently available. To the extent that prices have risen since 2000, the gross revenues estimated here, for the various alternatives, likely understate (to an unknown degree) the true gross revenue impacts that may accrue from adoption and implementation of one or another of these management regimes.

The use of 2000 prices may also be problematic because of the large changes in aggregate harvests of some species associated with some of these alternatives. Alternative 2, in particular, is likely to result in large reductions in harvests. Reductions in aggregate harvest of a species should bring about increases in the first wholesale prices for that species, all else equal. This price increase should offset some of the impact of the harvest reduction on gross revenues. This issue is not addressed in the quantitative analysis conducted here. For a more detailed treatment of this particular issue, the reader is directed to the discussion of "Harvests and fish prices", presented earlier in the current section of this RIR (Section 1.3.3.1) and to the Market Analysis of Alaska Groundfish Fisheries (Appendix D).

The gross revenue impacts associated with the alternatives (with separate estimates for Alternative 4 and a variant of Alternative 4 - Option 3) are summarized in Table C-18. All reported values are rounded to the nearest million dollars.

Table C-18 Comparison of the gross revenue effects of the alternatives in 2002 (millions of dollars)

	Alternatives					
	1	2	3	4	4 (w/opt. 3)	5
Potential gross revenues given TACs	1,358	973	1,337	1,333	1,333	1,332
Revenues "at risk" from closed critical habitat	20	295	235	74	79	51
Revenues "at risk" in open critical habitat	8	0	137	1	1	82
Additional revenues "at risk" due to total groundfish trawl ban in critical habitat	0	33	0	0	0	0
Total of revenues "at risk"	28	328	372	75	80	133
Difference between gross revenues for the listed alternative and gross revenues for the Alternative 1 baseline	0	-385	-21	-25	-25	-26
Difference between revenues "at risk" for the listed alternative and Alternative 1 revenues "at risk"	0	300	344	47	52	105

On the basis of the "adverse effect on gross product value" criteria, Alternative 1 imposes the smallest potential impact. This alternative only retains provisions to protect Steller sea lions that are incorporated into permanent regulations (as of 1999). All SSL mitigation provisions implemented by emergency regulations are assumed to be eliminated, under this alternative. Essentially, this puts fishery regulation in the posture in which it stood in 1998, plus permanent regulations restricting the Atka mackerel and pollock fisheries that were implemented in 1999. The Pacific cod and pollock fisheries are not regulated to protect Steller sea lions under this alternative. The reader is referred to Section 2.3.1 of this SEIS for a detailed discussion of Alternative 1.

Maximum gross revenues under Alternative1 are estimated to be $1.358 billion. The revenues placed "at risk" by the restrictions on fishing in critical habitat under this alternative total just $28 million. As noted earlier, the industry may be able to make up some of the revenues placed at risk by altering fishing activity to fish at other times or places. Alternative1 places limits on Atka mackerel harvests in open critical habitat in the central and western Aleutian Islands fishing areas (Areas 542 and 543).

Alternative 2, the "Low and slow" alternative, is the most restrictive, on the basis of these 'gross revenue' criteria. It is based on an alternative in the Draft Programmatic SEIS (NMFS, 2001a) prepared in the summer of 2000, that was meant to provide maximum protection for Steller sea lions. (The reader is referred to

Section 2.3.2 of this SEIS for a detailed description of Alternative 2.) These analytical results suggest that it does so at a large cost to the groundfish fishing and processing industry in forgone revenues.

This alternative imposes large reductions on the fishing TACs in different areas, and imposes a strict system of seasonal TAC allotments, meant to spread fishing out in time. These fishing constraints are much stricter than those contained in the other alternatives. The maximum gross revenues from this alternative are $973 million. This is $385 million less than the maximum estimated for Alternative 1. No other alternative comes close to these reductions in gross revenues.

Two elements in Alternative 2 may mean that the actual reduction in revenues due to TAC restrictions may be even greater than estimated. First, a large number of seasonal TAC allotments, combined with reduced overall TACs, means that fishery managers may be faced with managing fisheries with very small harvest targets. There is a real possibility that managers may not be able to safely open fisheries for some TAC allotments. Thus, TAC allotments technically available under this proposal may, in fact, be forgone for management reasons.

Alternative 2 also has a provision requiring exclusive area registration for operations fishing pollock, Atka mackerel, and Pacific cod. Fishing operations may tend to register for areas with relatively large TAC allotments, and refrain from registering to fish in areas with smaller allotments. This may also result in some technically available allotments not being fished.

In addition to the reductions in harvest associated with the TAC restrictions, Alternative 2 contains relatively stringent limits on fishing activity in critical habitat. The model suggests that the limits on pollock, Atka mackerel, and Pacific cod fishing place $295 million, in fishery gross revenues, "at risk." Only Alternative 3, based on the RPAs from NMFS's November 2000 Biological Opinion, comes close to this level "at risk" gross revenues.

Alternative 2 contains a further provision that is not found in the other alternatives. Under Alternative 2, groundfish trawling for all species would be prohibited inside critical habitat. This is a considerable extension of Steller sea lion protection measures over those contained in the other alternatives, in so far as the focus of the action has principally been the pollock, Pacific cod, and Atka mackerel target fisheries. Adoption of a complete ban on trawling would extend the reach of this action to include many more groundfish species and species groups, including turbot, Pacific Ocean perch, rockfish, rocksole, sablefish, other flatfish, and yellowfin (among others).

The revenues placed "at risk" from this provision of Alternative 2 were calculated by estimating the proportions of the total catches of the relevant species coming from critical habitat in 1999, applying these proportions to the 2001 TACs for these species, and converting the results into first wholesale 'gross revenues', using 2000 first wholesale weighted round ton equivalent values. Excluding the impacts on pollock, Pacific cod, and Atka mackerel trawlers, which are fully accounted for in the previous estimates of "at risk" revenues due to closure of CH, the trawl ban provision of Alternative 2 places an additional (approximately) $24.5 million "at risk", in the BSAI, and a further $8.3 million "at risk", in the GOA; or a total of approximately $33 million.

Alternative 3, "The restricted and closed area approach", is the RPA detailed in the November 30, 2000 Biological Opinion. The essence of this approach is the establishment of large areas of critical habitat where fishing for pollock, Pacific cod, and Atka mackerel is prohibited, and the restriction of catch levels in remaining critical habitat areas. The reader is referred to Section 2.3.3 of this SEIS for a detailed description of Alternative 3.

Alternative 3 appears to be the second most restrictive alternative, after Alternative 2, on the basis of this criterion. The maximum gross revenue permitted by the TAC levels under this alternative are $1.337 billion. This is actually close to the levels estimated under Alternative 1 (the 'no action' baseline alternative). However, this alternative places $235 million at risk through closure of critical habitat to different types of fishing activity, and it places another $137 million at risk through limits on the amounts of fish that may be taken during various periods, by fishing activities in open critical habitat. The total gross revenue placed at risk through these two types of restrictions, under Alternative 3, is estimated at $372 million. Alternative 2 is stricter than Alternative 3 when the impacts of the lower TAC and the gross revenues "at risk" are both considered.

Alternative 4, "The area and fishery specific approach", traces its lineage to the work of the NPFMC's Steller sea lion RPA committee, in the winter and spring of 2001. The reader is referred to Section 2.3.4 of this SEIS for a detailed description of Alternative 4.

Alternative 4 actually appears to impose fewer TAC related restrictions on the fishery than Alternative 1. Maximum gross revenues under Alternative 4 are estimated at $1.333 billion; this is $25 million less than the maximum under Alternative 1. Alternative 4 also places considerably more gross revenues at risk from closed critical habitat, $75 million as compared to $28 million. Alternative 4 contains provisions limiting pollock harvest in open critical habitat in the Bering Sea. However, these limits do not appear to constrain the fishery when contrasted with its harvest patterns in earlier years (i.e., do not represent a binding operational constraint).

Alternative 4 contains three suboptions, of which Option 3 is analyzed here. Option 3 substitutes a system of continuous 'bands' along the coast of the GOA. Bands closer to the coast impose stricter limitations on fishing, by gear type, than bands further from the coast. The reader is referred to Section 2.3.4 of this SEIS for a detailed description of Alternative 4's Option 3. The 'band" approach used in Option 3 is somewhat more restrictive than the approach in the basic version of Alternative 4. The maximum gross revenues are the same, because the overall TACs and their distribution through time are unchanged. However, the introduction of the bands increases the gross revenues placed at risk in closed critical habitat by about $5 million dollars (to $80 million in total).

Alternative 5, "The critical habitat catch limit approach," is derived from the suite of RPA measures that were in place for the 2000 pollock and Atka mackerel fisheries, and measures considered by the Council and NMFS for the Pacific cod fishery, that include seasonal apportionments and harvest limits within critical habitat. Essentially this alternative limits the amount of catch within critical habitat to be in proportion to estimated stock biomass. The reader is referred to Section 2.3.5 of this SEIS for a detailed description of Alternative 5.

Alternative 5 constrains potential maximum harvest somewhat, as compared to the baseline no action alternative. The maximum harvest of $1.332 billions is about $26 millions smaller than the maximum projected under Alternative 1. The real impact on gross revenues comes , however, through the prohibitions on fishing activity in closed critical habitat (placing approximately $51 million in gross revenues at risk), and through limits on the amounts of fish that may be taken in open critical habitat (about $82 million at risk). The total placed at risk under this alternative is $133 millions.

In summary, the alternatives differ considerably in their likely impact on first wholesale gross revenues. The alternatives likely rank ordinally as shown below. The rankings are based on the difference between maximum gross revenues and gross revenues placed "at risk."

Table C-19 Ranking relative to impact on gross revenues

Alternative 1 (No Action)	**Alternative 2** (Low and slow)	**Alternative 3** (Restricted and Closed Areas)	**Alternative 4** (Area and Fishery Specific)	**Alternative 5** (CH Catch Limit)
Relatively little impact on 'historical' maximum gross revenues; least revenues placed at risk; constitutes analytical 'baseline'	Largest reduction in maximum gross revenues; second largest revenues placed "at risk"	Relatively little impact on maximum gross revenues, as compared to the no action; largest revenues placed "at risk"	Largest projected maximum gross revenues; intermediate level of gross revenues placed "at risk"	Relatively little impact on maximum gross revenues, as compared to the no action; intermediate level of gross revenues placed "at risk" (greater than Alternative 4)
1st	5th	4th	2nd	3rd

Possible long-term market changes

Significant reductions in product output may cause (both intermediate and final) buyers to look elsewhere for supplies, or switch to substitute products. Through time, users may alter their consumption patterns (e.g., tastes and preferences) and, as a result, buying habits, in response to higher prices, reduced supplies, or changes in real or perceived product quality. These may be behavioral changes that cannot be overcome easily, if and when supplies return to their previous levels. That is, the result may be permanent structural damage to markets and loss of market-shares to competing suppliers from other regions or nations.

A thorough treatment of this issue is beyond the capabilities of this analysis. Nonetheless, it should be noted, virtually all of the product forms deriving from GOA and BSAI pollock, Pacific cod, and Atka mackerel catches trade in world markets, where supply and demand relationships are further complicated and confounded by macroeconomic influences. Markets are very dynamic institutions. Changes in supply on the order of those which may be associated with several of the proposed SSL Protection Measures could certainly result in price, market share, and demand substitutional responses, which cannot be quantitatively anticipated.[11] Each has the potential to impose substantial and lasting adverse economic impacts on the U.S. domestic groundfish industry operating in the EEZ off Alaska, and could impact the United States' balance of trade unfavorably (e.g., export sale decline, imports increase).

[11] Changes in the product mix or the amounts of individual products on the market are difficult to anticipate or value. Further complicating the attempt to estimate impacts is the fact that a significant share of total output from BSAI and GOA fisheries is exported. Changes in consumer surplus (and, for that matter, producer surplus) attributable to a regulatory action, but which accrue to non-U.S. consumers (producers), are not to be included in regulatory impact estimates, according to OMB direction.

The products forms that derive from the three species are varied, and enter different market environments. As such, the long-term damage to market share will be more or less significant, depending upon the product form and principal market in question. For pollock, surimi and roe are sold predominantly to Japanese markets, but there are (in general) no close substitute products and limited alternate supplies from other countries.

The same cannot be said for pollock fillets. Several large fast food retailers in the United States depend upon supplies of deep-skin fillets, and use pollock primarily because of its reliability of supply and uniformity of portion and quality. If that supply were to be interrupted, a shift would likely take place, perhaps permanently, to other supplying countries, product forms, and/or substitute species.

A similar circumstance might befall U.S. producers of Pacific cod products, which must compete in well-established markets characterized by long-standing relationships. The inroads that Pacific cod suppliers have made in filling the void left by the declining Atlantic cod supplies could very well be lost, at least for some time. Recovery of market share, once lost to a competitive supplier or substitute species, is not certain, simple, nor costless.

1.3.3.2 Product Quality and Revenue Impacts

The suite of SSL Protection Measure alternatives, proposed in lieu of the 'status quo', impose restrictions on the timing and location of vessel operation which might lead to a decline in product quality and associated reductions in the price industry receives for fishery products. Changes in product quality may occur for several reasons:

- fishermen may be required to fish farther away from processors, necessitating their traveling greater distances to deliver their catch.
- fishermen may be impelled to fish on stocks of sub-optimal sized fish.
- fishermen may be induced to target on stocks during periods when fish are not in optimal physical condition (e.g., post-spawning).

Longer travel to deliver fish

The interval between catching and initiation of processing is, reportedly, negatively correlated with product quality (and, thus, value). Some reports suggest that, on a 'product for product' basis, the quality of Pacific cod and pollock harvested and processed at-sea is uniformly higher than that of product produced onshore, owing primarily to the significant difference in the interval of time between catch and processing.[12] For those vessels which do not have the capability to process their own catch, given a fixed catch rate and hold capacity, any action which substantially increases the time between catch and delivery imposes costs, both on the harvester and the processor. Beyond some point (which varies by vessel size, configuration, condition of the target fish, and weather/sea conditions) delivery of a "usable" catch (i.e., one with an economic value to the fisherman and processor) is not feasible.

In this latter connection, a concern common to all operators delivering catch ashore for processing is the effective time limit which exists from "first catch onboard", until offloading must take place to deliver a "salable" catch. Informed sources in the industry place the maximum interval at 72 hours (at least in the case of pollock). Clearly, if fishing grounds which remain open under one or another of the SSL Protection

[12]Per. comm. Bill Atkinson, July 2000

Measure alternatives are more remote from sites of inshore processing facilities, greater portions of this 72 hour window will be consumed in transporting catch from the grounds to the plant. For smaller vessels, with more limited holding capacity and slower running speeds, this limit will impose relatively greater constraints (i.e., operational burdens). The result may be an effective intra-sectoral redistribution of catch share. That is, while in some instances sector-specific apportionments of TAC have been provided for in regulation (e.g., BSAI Pacific cod allocations, by gear and processing mode), closures (or other operational restrictions) of fishing grounds adjacent to inshore processing facilities may inadvertently redistribute the catch within a sub-sector, from the smaller, least operationally mobile vessels, to the larger, faster, more seaworthy elements of the fleet. In the longer run, this may have the added (undesirable) effect of inducing further 'capital stuffing' behavior within the industry, as those disadvantaged small boat owners perceive the need to invest in added capacity to continue to participate profitably in the fishery.

Several of the alternatives to the 'status quo', under consideration herein, contain explicit provisions which appear to have the potential to mitigate some (but clearly not all) of these adverse effects. These alternatives are "ranked", on a relative scale, in terms of this (and the following cost and benefit) criteria in Table C-22. The SSL protection provisions (which differ in detail among the several alternatives) appear, nonetheless, to recognize the potential disproportionate burden which could be imposed upon those specific operations with limited mobility (e.g., boats less than 60', dependent upon delivering catch to onshore processors immediately adjacent to one or more of the proposed 'limited fishing zones'), should the regulatory provisions be uniformly imposed, without recognition of the inherent differences in capacity and capability reflected in the fleet.

Change in average size of fish

A corollary effect of altering the timing and/or location of catch (which each of the four alternatives to the status quo does to one degree or another) might accrue, should the average size of fish in the catch fall below the "minimum" requirement for specific product forms (e.g., deep-skin fillets). These minimums are often dictated by the marketplace, but may also be directly linked to the technical limits of the available processing technology.[13] It is the case that these impacts could accrue to any or all segments of the fishery. For example, on average, fillet production "requires" a larger pollock than does, say, surimi production. If temporal and/or spatial dispersion (provided for in any specific alternative under review) results in a significant decline in the average size of fish harvested by a given operation, there could be adverse effects on product mix, quality, grade, and value.

There was some preliminary information, compiled during the American Fisheries Act analysis, which suggested that during the "A" season, in the EBS, pollock harvested outside of the CH-CVOA were somewhat smaller, on average, than those taken inside that area. The difference did not appear to be "significant" enough to represent a serious economic or operational burden to the industry, at that time. However, this result may not be indicative of the outcomes under (some of) the present proposed actions. This may be so because the catch composition "difference", cited from the AFA analysis, while reflecting "area" differentials (i.e., inside CH-CVOA versus outside), did not include any attributable change in fish size associated with temporal changes in fishing patterns, which might be prescribed under one or another of the SSL action (e.g., Alternative 2, prescribing four equal season allocations, with no rollover). It is the case that data on commercial catch composition, for the areas and times into which the pollock, Pacific cod, and Atka

[13] For an extensive discussion of this topic, see the Final EA/RIR prepared for the Improved Retention/Improved Utilization (IR/IU) FMP for the Bering Sea Groundfish Fisheries, NPFMC. September 1996.

mackerel fisheries may be displaced under the SSL Protection Measure alternatives, are not readily available. In many respects, the alternative area openings and closures, zonal restrictions, and schedule changes in timing of TAC releases do not coincide with recent historical commercial fishing experience. As a result, there are no empirical data upon which to "predict", or even "speculate" about probable fish size (among other attributes of the harvest) in these areas and at these times.

In the limit, of course, some operations may be unable to produce any marketable product from a significant portion of their catch, should average fish size drop below market or technical limits (e.g., a "fillet-only" boat might be unable to utilize much of its catch if its average size-per-fish was below the production specified minimum size). In such cases, given the prohibition under IR/IU on discarding Pacific cod or pollock, such a vessel would, in effect, face an operational shut down, being simultaneously unable to "utilize" its (herein assumed, undersized) catch, or legally to "discard" any of it.[14]

While Atka mackerel is not governed by IR/IU restrictions, those close to the industry suggest that there currently exists a "marketable minimum size" for this species; and if the average size fish falls, due to, for example, temporal or geographic displacement of fishing effort prescribed by the SSL Protection action, one can anticipate increased discards, with associated higher operating costs per unit of retained catch and product output.[15]

Targeting post-spawning fish

Traditionally, two of the three target fisheries of concern here (i.e., pollock, and Pacific cod) tend to focus effort on spawning aggregations, containing high concentrations of "roe-bearing" fish, in the late winter and early spring of the year. The post-spawning fish themselves (not considering the absence of roe and milt) are reported to be of lower value. For example, it has long been asserted by the industry that, at least in the BSAI,[16] post-spawn pollock are of poorer physical condition (e.g., soft flesh, high water content) and, thus, of significantly lower value than winter fish, or those taken later in the fall fishery. Cod fishermen report equivalent reductions in flesh quality, post-spawning, and accompanying dramatically diminished value. Both species reportedly "improve" in quality (and value), the later into the second half of the year they are taken. Therefore, any action which displaced catch from periods of relatively high fish quality (e.g., January through perhaps March), to periods where the average quality is lower (e.g., June and July), would impose costs. In fact, aspects of several of the proposed alternatives to the status quo make provisions for release of significant portions of TAC during (in the case of pollock and cod) the post-spawn/pre-recovery (and in the case of Atka, during the summer spawn) seasons. The greater the departure from the traditional exploitation patterns in these target fisheries (in terms of availability of TAC amounts, as well as timing of TAC releases) the more potentially adverse the economic consequences for the industry.

Under an open access management structure (which, at present, largely prevails in these fisheries) the difficulty is, even when it is clear to all concerned that there are real economic gains to be had from postponing initiation of fishing until, in this example, the flesh quality improves, this outcome will not likely

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[14] Currently, both pollock and Pacific cod are governed by provisions of the IR/IU program, which requires full retention of all pollock and Pacific cod catches, in all groundfish fisheries in the U.S. EEZ off Alaska. Only in cases where fish are "tainted", and thus unsuited for use in production, may pollock and Pacific cod be discarded. And then, the reason for, and quantity of, any such discards must be logged and reported by the operator.
[15] John Henderschedt, "Personal Communication," Groundfish Forum, 4215 21st Avenue West, Seattle, WA 98199, June 2001.
[16] Informed sources suggest that in the GOA there is not the same concern about pollock taken in the post-spawn period (Chris Blackburn, "Personal Communication," P.O. Box 2298, Kodiak, AK 99615, 1998).

emerge. Each operator, seeking to maximizes his or her 'share' of the take from the common pool, will be compelled to begin fishing before the fish have returned to optimal condition, despite the potential collective benefit from a delay. Behavior which is in the sector's or industry's (and society's) collective best interest is individually irrational, under these conditions. That is, while the "best" solution might be a voluntary delay by everyone in initiating the fishery, the underlying 'race-for-fish' likely will induce all participants to beginning fishing as soon as regulations permit and before the stocks have recovered. This will result in harvesting fish of lower quality and value, and may mean a further attributable loss to consumers. None of the proposed SSL Protection Measure alternatives address this fundamental structure problem, inherent in open access fishing.

1.3.3.3 Operating Cost Impacts

The discussion in the two preceding sections examined the potential '*revenue*' impacts associated with the suite of SSL Protection Measure alternatives. Several possible impacts were addressed: (1) higher prices, (2) reduced production, (3) long term structural changes in markets and market share, and (4) product quality impacts. It is also true, however, that any regulatory action that requires an operator to involuntarily alter his or her fishing pattern (whether in time or space) will impose *'costs'*. The restrictions included among the proposed SSL Protection actions, will almost certainly affect the operating costs of the fishing fleets exploiting the Pacific cod, pollock, and Atka mackerel resources, as compared to the status quo condition. The following section addresses this issue.

Variable costs

Economists tend to divide costs into two general categories, 'fixed' and 'variable', where fixed costs tend to arise from investment decisions and variable costs arise from (short run) production decisions. As the terms imply, fixed costs are those which do not change in the short run, no matter what the level of activity. Variable costs, on the other hand, are those costs which do change directly with the level of activity, recognizing that variable inputs must be used if production exceeds zero.

While empirical data on operating cost structure, at the vessel or plant level, are not available, "cost trends" for key inputs may shed some light on the probable impacts of the suite of proposed SSL Protection Measure alternatives on the industry, in the aggregate and on average. One such "trend analysis" is presented below.

Of all the categories of variable factor costs, 'fuel' ranks at or near the top of the list of operating expenses in the fisheries under consideration in this action. Furthermore, even a qualitative evaluation of the elements of the suite of SSL Protection actions (e.g., time and area closures, no fishing zones, no transit zones, modified patterns of TAC releases) suggest that the proposed regulatory changes will likely result in: (1) more total trips between port and fishing grounds in response to increased numbers of 'openings' during the fishing year; (2) longer average trip duration; and (3) greater total distances traveled per trip (perhaps under more extreme operating conditions).

Projecting how changes in fuel usage will impact operating costs (and thus the net revenues of the operator) actually depends on two factors. The first is how much fuel must be burned, per unit catch. While it is not possible to place a numerical estimate on this factor, it is reasonable to conclude that (on average) total fuel consumption will *increase* (although likely to differing degrees), relative to the status quo, under each and every one of the proposed alternatives.

The second factor determining the effect on this variable cost component is the price paid for each gallon of fuel. Given that total gallons consumed will (likely) increase, fuel cost per gallon will largely determine how substantial will be the economic burden of additional operating time, for any given vessel. One can chart the recent path of fuel prices in the region, which may provide a gross "indicator"of this impact (at least in the short term).

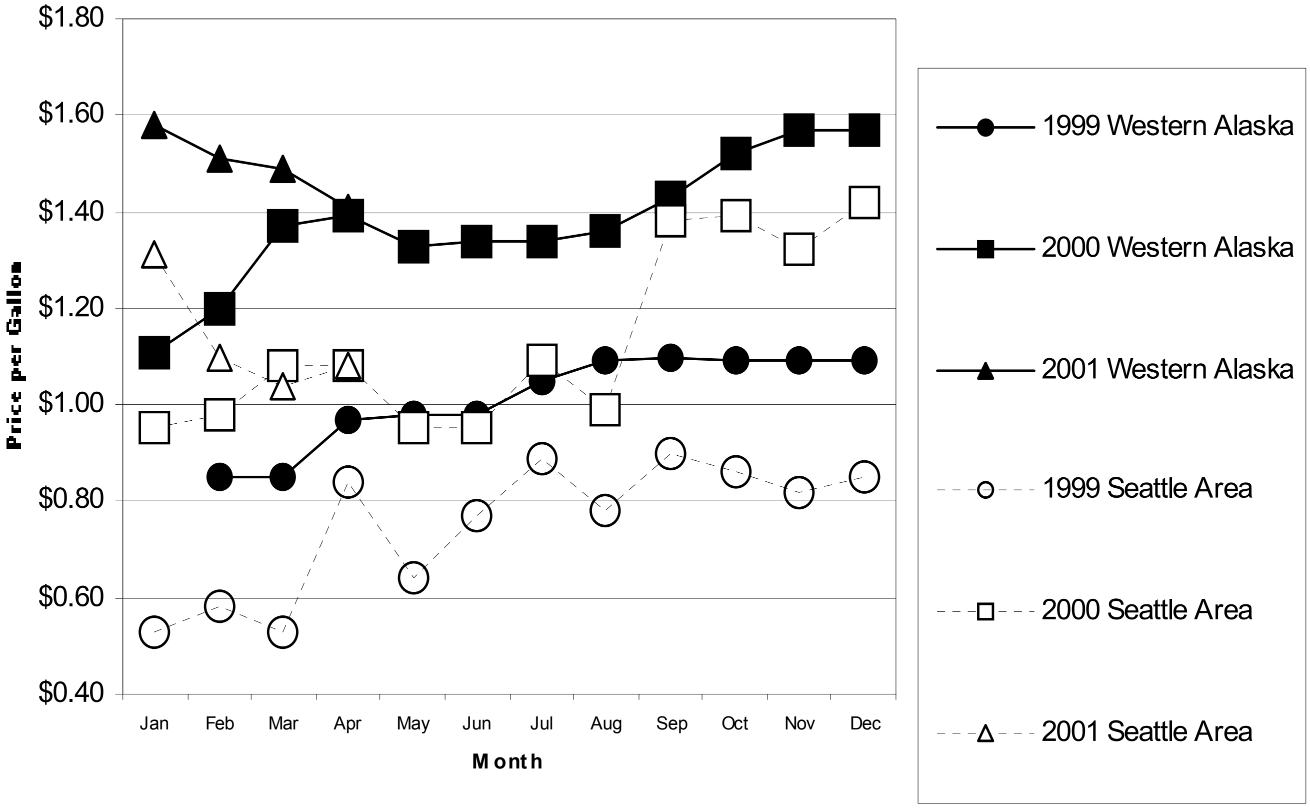
Port by port surveys of fuel suppliers, conducted by the Pacific States Marine Fisheries Commission, Economic Data Program, suggest that fuel prices have been trending up, strongly, over the past several seasons. There is reason to expect that this pattern will continue through the near term. Regional fuel prices (for #2 marine diesel) for Seattle and for ports in central and western Alaska (including the Bering Sea) are summarized in Tables C-20 and C-21, and Figures C-1 and C-2.

Table C-20 Average marine fuel price, by region

2001	Jan	Feb	Mar	Apr	May	Jun
Western Alaska	$1.58	$1.51	$1.49	$1.41	**	**
Seattle Area	$1.31	$1.10	$1.04	$1.08	**	**
2000	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Western Alaska	$1.11	$1.20	$1.37	$1.39	$1.33	$1.34
Seattle Area	$0.95	$0.98	$1.08	$1.08	$0.95	$0.95
	Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Western Alaska	$1.34	$1.36	$1.43	$1.52	$1.57	$1.57
Seattle Area	$1.09	$0.99	$1.38	$1.39	$1.32	$1.42
1999	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
Western Alaska	**	$0.85	$0.85	$0.97	$0.98	$0.98
Seattle Area	$0.53	$0.58	$0.53	$0.84	$0.64	$0.77
	Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Western Alaska	$1.05	$1.09	$1.10	$1.09	$1.09	$1.09
Seattle Area	$0.89	$0.78	$0.90	$0.86	$0.82	$0.85

Note: **Data not collected.
Source: Pacific States Marine Fisheries Commission, Economic Data Program.

Figure C-1 Average before-tax cash price based on purchases of 600 gallons of #2 marine diesel



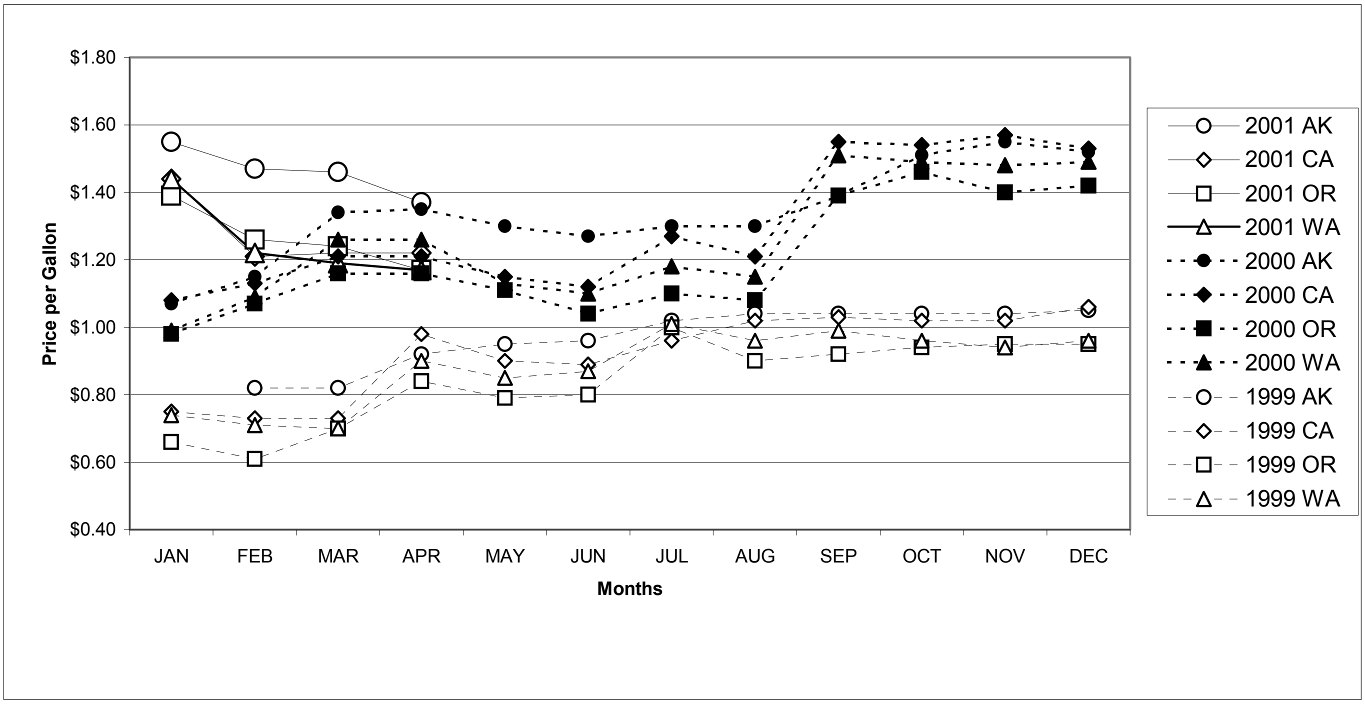
Source: Pacific States Marine Fisheries Commission, Economic Data Program

Table C-21 Average marine fuel price, by west coast state

2001	Jan	Feb	Mar	Apr		
AK	$1.55	$1.47	$1.46	$1.37		
CA	$1.44	$1.21	$1.22	$1.22		
OR	$1.39	$1.26	$1.24	$1.17		
WA	$1.44	$1.22	$1.19	$1.17		
2000	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
AK	$1.07	$1.15	$1.34	$1.35	$1.30	$1.27
CA	$1.08	$1.13	$1.21	$1.21	$1.15	$1.12
OR	$0.98	$1.07	$1.16	$1.16	$1.11	$1.04
WA	$0.99	$1.09	$1.26	$1.26	$1.13	$1.10
	Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
AK	$1.30	$1.30	$1.39	$1.51	$1.55	$1.52
CA	$1.27	$1.21	$1.55	$1.54	$1.57	$1.53
OR	$1.10	$1.08	$1.39	$1.46	$1.40	$1.42
WA	$1.18	$1.15	$1.51	$1.49	$1.48	$1.49
1999	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**
AK	**	$0.82	$0.82	$0.92	$0.95	$0.96
CA	$0.75	$0.73	$0.73	$0.98	$0.90	$0.89
OR	$0.66	$0.61	$0.70	$0.84	$0.79	$0.80
WA	$0.74	$0.71	$0.70	$0.90	$0.85	$0.87
	Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
AK	$1.02	$1.04	$1.04	$1.04	$1.04	$1.05
CA	$0.96	$1.02	$1.03	$1.02	$1.02	$1.06
OR	$1.00	$0.90	$0.92	$0.94	$0.95	$0.95
WA	$1.01	$0.96	$0.99	$0.96	$0.94	$0.96

Note: Data not collected.
Source: Pacific States Marine Fisheries Commission, Economic Data Program

Figure C - 2 Average before-tax cash price based on purchases of 600 gallons of #2 marine diesel



Source: Pacific States Marine Fisheries Commission, Economic Data Program.

Fixed costs

As suggested earlier, many costs confronting operators in these fisheries are fixed; that is, they do not change with the level of production. Fixed costs include such expenses as debt payments, the opportunity cost of the investment in the vessel (or plant), the cost of having the vessel or plant ready to participate in the fisheries, some insurance costs, property taxes, and depreciation. Following an action which negatively affects, for example, CPUE, these costs must be distributed across a smaller volume of product output, raising the average fixed cost per unit of production.

As previously noted, available information on the cost structure of operations fishing for and processing groundfish is very limited. This is largely so because cost information is often considered highly proprietary by industry members and is, under the best of circumstances, expensive to collect and analyze. Only scattered anecdotal information at the operation level, is available on groundfish fishing costs. It is, therefore, impossible in the balance of this section to do more than provide a qualitative discussion of the impact of the proposed SSL Protection Measure alternatives on “operating costs”.

The Principal Sources of Direct Cost Impacts

It has been suggested by some in the industry that fishing costs may increase so much, as a result of the provisions contained in one or another of the SSL alternative actions, that fishermen will not be able to completely harvest the TACs, for some target species, at least in some areas or during some open periods.

The loss of the revenues in these instances has been discussed above (and gross revenue "at risk" estimates, by SSL Protection Measure Alternative, are presented in Section 1.4.2).

On the cost-side, it is the case that those revenue losses may be offset, to an unknown extent, by associated reductions in the variable operating costs these operations would otherwise have incurred, in the absence of the proposed regulatory change. From the operator's perspective, for example, fewer days fishing would mean reductions in variable costs (e.g., stores, bait, lubricants and fuel expense), reduced wear and tear on vessels and gear, and reduced processing, packaging, and storage expenses for the product. It would also mean reduced payments to labor (although the other side of that coin reflects foregone wages to the skipper and crew, as well as the social value of other goods and services the fishermen might have produced).

On the other hand, the cost of fishing for what continues to be caught will tend to *increase,* for several reasons. This will reduce the net value of each pound harvested and processed. These reasons include:

- Increased travel time to and from more distant fishing grounds
- Costs of learning new grounds
- Costs of undertaking bycatch avoidance measures, or premature closure due to excessive bycatch, if these efforts are unsuccessful
- Reduced CPUE due to less concentrated target stocks;
  (including a discussion of "platooning" as a possible partially mitigating response)
- Costs of stand-downs and lay-ups
- Maximum daily catch limits
- Potential gear conflicts
- Costs of fishing Pacific cod, pollock, or Atka, when other economically important fisheries are open
- Processing facilities built for higher throughput
- Reduced safety of fishing operations (dealt with in detail under its own heading at Section 1.3.4.4)
  Increased travel time to and from more distant fishing grounds

Vessels that had formerly been able to fish areas nearer shore, and in relative proximity to their port of operation, may now be pushed farther offshore and/or into more remote fishing areas, as a result of specific provisions contained in the suite of SSL alternatives under consideration by the Council. Simply 'running' to one of the remaining open fishing areas, prospecting for harvestable concentrations of Pacific cod, pollock, or Atka mackerel, then (depending on operating mode) running back to port with catch or product will, as previously noted, require increased expenditures of fuel and other consumable inputs, as well as more time on the water (i.e., trips may be longer, all variable operating costs and wear and tear on equipment and crew will increase).

These structural changes in fleet operating patterns will likely require a greater total number of days for a given vessel to take its 'share' of the available TAC, all else equal.[17] How many additional days may be required would vary by stock and ocean conditions, rates of success in locating fishable concentrations of the target species in remaining open areas or time periods, operational mode and capacity, the level of aggregate effort exerted by the fleet or sub-sector in the remaining open areas, etc. But clearly, as catch per unit effort declines, cost per unit of catch will increase.

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[17] In the limit, of course, the potential clearly exists for one or more sectors to fail to catch 100% of its allocation. Indeed, under existing RPA restrictions, implemented in 1999 for the Atka mackerel fishery in the Aleutians, significant portions of the allocated TAC were not harvested, reportedly, due to imposition of CH-area restrictions, resulting in significantly diminished CPUE, as well as excessive bycatch of rockfish.

Travel costs may be increased by rules prohibiting the transiting of critical habitat by fishing vessels (a provision which each of the five SSL Protection Measure alternatives explicitly contains). In the limit, smaller vessels may be so disadvantaged by the distances that must be traversed between port and open fishing grounds, when intervening areas are closed to transit, that they may be unable to operate economically (perhaps even physically) under these circumstances. These vessels could be effectively closed out of the fishery.

Even vessels which have the capacity to circumnavigate "no transit zones" to reach open fishing grounds may incur prohibitively high operating costs (e.g., excessive fuel consumption), increased risk (e.g., should sea or weather conditions change unexpectedly), and reduced product quality (i.e., as hold-time increases). Anecdotal reports offered at the December 2000 Council meeting (specific to the proposed BiOp RPA open, closed, and "no transit" zones) suggested that, in some cases, a vessel wishing to participate in a commercial opening might be required to sail from port to one open area, then (depending upon success, available quota, etc.) be required to retrace its route, back to the vicinity of the original point of departure, before sailing to an alternative open area, even though a much shorter direct route was available, albeit through a designated "no transit zone." In an open access fishery especially, the old adage "time is money" is fundamentally true, thus longer distances and more time in transit mean higher operating costs and less time "fishing".

Costs of learning new grounds

It is axiomatic, but fishermen fish when and where they believe the fish are most valuable and most readily available. Under provisions of the suite of SSL measures under consideration by the Council, open and close areas, timing (and size) of TAC releases, gear restrictions, and mobility constraints will compel operators to significantly alter the timing, location, and pattern of operation they would (as profit maximizing entities) voluntarily choose to undertake. That is, in many instances, fishermen will be required to fish on grounds with which they are unfamiliar, and at times of the year when they haven't previously fished for the target species. Fishermen will face a learning curve on these new grounds and at these new times. They will have to become accustomed to a new physical geography underwater and perhaps more extreme and/or exposed sea surface conditions; to new fish locations, behaviors, and habits; and to new patterns of bycatch. While they learn to operate within these new parameters, they will likely incur increased operating costs. Gear may be lost or damaged more frequently, catch per unit of effort (CPUE) will likely be lower, and bycatch of other species may be higher. Higher bycatch may force early closures of fishing grounds, and with fewer optional 'open' fishing areas available, it will be more difficult (and thus more costly) for operators to move off 'hot spots' to reduce or avoid bycatch. Even if the bycatch is composed of species for which there is no potential risk of regulatory 'closure', the additional resources required to land, sort, and discard unwanted catch will increase operating costs.

Because, in many instances, large volumes of fish will have to be taken in places and at times when they have never been taken before, there is little available information for fishermen to use to make inferences about these issues, beforehand. Thus, they will have very little opportunity to 'avoid' incurring the costs of prospecting new areas (at new times) even if, subsequently, the effort proves uneconomical, from the standpoint of catch success.[18]

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[18] Note, elsewhere it has been argued that, "...operating costs may be reduce (avoided), as production levels decline..." While possible for, say, a processing plant, which may take a portion of its capacity off-line in a cost

(continued...)

Costs of bycatch avoidance measures

While the selectivity of the gear fished for these target species varies, groundfish fishermen unavoidably take other species, as incidental catch, when they fish for pollock, Pacific cod, and Atka mackerel. In some instances (e.g., bycatches of halibut, salmon, herring, and crabs), groundfish fishermen are subject to limitations on the amounts of bycatch that they may take. When the bycatch limits (or caps) are reached, the fishery is closed. Fishermen can, to a greater or lesser degree, reduce bycatch by modifying their gear, or the way they use it, and by learning the times and places when unacceptably large bycatches might take place. Both bycatches, and the avoidance measures that they make necessary, impose costs on the operations.

BSAI Pacific cod pot operators suggest that, for example, if they are pushed north, out of eastern Bering Sea (EBS) critical habitat areas, their crab bycatch rates will become prohibitive and they will actually be forced to forego significant amounts of Pacific cod catch.[19] Similarly, Pacific cod trawlers and longline operations report halibut, salmon, and crab bycatches become prohibitive when fishing from late-spring through early-fall months (periods into which several of the SSL alternatives would reapportion significant shares of the annual Pacific cod TAC, thus effectively compelling effort to follow).

Pollock operations, while not typically concerned with crab and halibut bycatch (at least since the prohibition of 'bottom trawling'), may face problems with salmon bycatch, when fishing farther to the north and west (outside EBS SSL CH and SCA), and in later periods of the year (e.g., mid- to late-summer). The Council has, in recent years, put increasing pressure on the Bering Sea pollock trawl fleets to reduce Chinook salmon bycatches. It has been even more aggressive concerning "other"(primarily chum) salmon bycatch, more recently, because of the critical problems with returns of chums in Western Alaska and A-Y-K.[20]

Under provisions contained in the AFA, Bering Sea pollock fishing cooperatives have been able to established a "salmon savings plan", proposed to facilitate attainment of the Council's objectives for salmon bycatch reduction. If pollock trawling is largely excluded from historically traditional fishing grounds in the EBS (e.g., CHCVOA, SCA), salmon bycatch may be higher than if the fleet has (fleets have) more flexibility to move away from salmon bycatch 'hot spots'.

Except for relatively small quantities of halibut, PSC bycatch has not traditionally been a serious concern in the Atka mackerel fishery, with this fishery never having been closed on the basis of "PSC bycatch".[21] It should be noted, however, that according to the NMFS' in-season managers, bycatches of sharpchin/northern rockfish (SCNO) were of sufficient concern in this fishery in 2001 that the industry, itself, asked for a closure of the "A" season fishery, so they could be assured of having enough SCNO to support their "B" season fishery in the eastern Aleutian management area, where Atka traditionally bring a much higher price. SCNO, which is composed predominately of northern rockfish, is generally discarded in the Aleutians, because of size and processing constraints (although it is typically retained in the Gulf). In any case, bycatch caps for

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[18](...continued)
savings effort to adjust optimal through-put to changing levels of fish deliveries, the fishing vessel operator must commit the majority of his/her variable input resources "before" obtaining any feedback as to probable return (i.e., it is much less likely operating costs can be avoided or significantly reduced, in this case, short of tying the vessel up).

[19] Arni Thompson, "Personal Communication," 3901 Leary Way NW, Suite 6, Seattle, WA 98107, July 2000.

[20] ADF&G's "Arctic-Yukon-Kuskakwim" fishery management area.

[21] Mary Furuness, "Personal Communication," NMFS, Alaska Region, P.O. Box 21668, Juneau, AK 99802, April 11, 2001.

this complex, in effect, work as a prohibited species cap in the Atka mackerel target fishery.[22] Industry sources suggest that SCNO bycatch is a real concern, under any of the alternatives, as rockfish are much more abundant (and therefore bycatches will potentially be much higher) outside of CH, in the Aleutians, than inside.[23] This increases the likelihood of SCNO-induced closures of the Atka fishery, unless effective avoidance measures can be developed and implemented.

Finally, with temporal and geographic dispersion provisions associated with the SSL action, there is the potential for increased interactions with other 'protected species' (e.g., short-tailed albatross, ESA listed PNW Chinook salmon)[24], which could require Section 7 consultation (with the potential to trigger further and more extensive fishing closures). This is especially of concern with respect to two of the target fisheries under review in connection with the SSL Protection Measures, but is not necessarily limited to these fisheries. Specifically, the Pacific cod freezer longline fleet has reported that, when that fishery is moved north (onto the 'flats') and into the summer months, the frequency of gear encounters with seabirds (and of particular concern, the short-tailed albatross) increases, as does the risk of a "take".

The second is the pelagic groundfish trawl fisheries (e.g., EBS pollock) which appear to have the greatest potential risk for interception of ESA listed PNW Chinook salmon. Chinook salmon interceptions are relatively high in both the winter season (January through April) and then again in the late fall fishing period (September-December). (Incidental bycatches of chum salmon would be expected to be highest in the fall fishery). Were a 'take' of a listed species to occur in these (or any other fishery), economic impacts could potentially extend to fleets targeting species other than pollock, Pacific cod, or Atka mackerel.

Reduced CPUE due to less concentrated target stocks

The economic, operational, and socioeconomic response of (and resultant outcomes for) individual operators may take several forms, following adoption of the finally determined SSL protection action. For example, anecdotal information supplied by the industry in public meetings and through individual contacts, suggest that CPUE may decline, in some cases substantially, as a result of significant fishing effort being forced into unfamiliar or unfavorable areas (or periods of the year). The effect of these declines, while perhaps present for all fishing sectors, will not likely be uniformly distributed across each management area, gear type, processing mode, or vessel size category and, thus, may carry with them very different implications for profitability, economic viability, and sustained participation in these fisheries.

For example, historically the Pacific cod fishery, for all gear groups, has been widely distributed (geographically) during the summer and early fall, because of the "post-spawn" dispersion of the cod resource, itself. In the period extending from 1995 through 1999, when there were no CH restrictions on Pacific cod fishing, significant amounts of longline catch occurred northwest of the Pribilofs and north of the SCA.

Pacific cod trawl fishing occurred both inside and outside SSL CH, although the summer trawl Pacific cod fishery is traditionally very small, reportedly because of low CPUE, owing to an absence of cod

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[22] Andy Smoker, "Personal Communication," NMFS, Alaska Region, P.O. Box 21668, Juneau, AK 99802, April 12, 2001

[23] John Henderschedt, "Personal Communication," June 2001.

[24] Cod longliners report interactions with albatross become a serious concern when fishing extends into late-spring and summer months.

concentrations. Indeed, according to industry testimony before the Council, trawl gear is, by-in-large, ill suited to targeting Pacific cod after the late-winter and early-spring nearshore spawning aggregations break up.

Empirical evidence supporting this assertion is present in the patterns of trawl sector allocations of cod TAC which are "rolled over" to fixed gear operators in the latter part of the fishing year. This occurs, reportedly, because Pacific cod catch rates are too low to sustain profitable effort with trawl gear. Incidentally, Pacific cod pot operators report the same problem. Namely, once cod spawning aggregations disperse, the catch rates for pot gear are, for the majority of operations, no longer sufficient to support an economically viable target fishery.

This may imply that the predicted 'adverse' economic effects imposed upon these two gear-specific sectors of the cod fishing industry (attributable to provisions of the SSL alternatives which tend to 'shift' catch into the latter half of the year) may not be as great (in this regard) as may first appear to be the case. That is, if Pacific cod trawlers and pot operators are traditionally, by-in-large, only marginally involved in the fishery during the second half of the year, in any case, then the proposed SSL Protection Measures may, in some respects, impose a smaller actual impact on these operators than has been suggested above.

Of course, this tentative conclusion rests on the implicit assumption that the Pacific cod pot and trawl sectors are able to prosecute economically viable fisheries, under the resulting regulatory constraints of whichever SSL action is finally adopted and implemented, during their traditional late-winter early-spring fishing period, when cod are aggregated and susceptible to pots and trawls. If that does not prove to be the case, then moving most, or even much, of the annual Pacific cod TAC release into periods when trawler and pot operators cannot economically prosecute a commercial fishery (e.g., unsustainably low CPUEs), will amplify, not diminish, the burden on these two gear sectors. That is, this anticipated "latter season decline in CPUE" carries with it economic implications which, while not primarily due to the provisions of the SSL action, may nonetheless in some ways be aggravated by it. Cod trawl and pot operators may take smaller shares (in both relative and absolute terms) of the TAC. Assuming the hook and line sector is able to exploit its natural advantage (during the period when cod are dispersed), there would be an expected inter-sectoral transfer of catch share and value, from trawler and pot operators, to hook and line operations, associated with this action. If the latter sector was not able to fully exploit this opportunity, some portion of the TAC would be foregone, representing a net loss to society. It is not possible to quantify this effect, nor to disaggregate the contributing parts, on the basis of available information.

Pollock, too, while perhaps more readily available outside of critical habitat and later in the fishing year than are Pacific cod, are found in less concentrated aggregations during the later-spring, summer, and early-fall period. Furthermore, even when fishable concentrations are available during this period, industry sources report that the fish tend to be of lesser value (e.g., smaller size, non-roe bearing, poorer flesh quality). CPUE is clearly lower than late winter/early spring fisheries, when pollock are in spawning aggregations. Thus, to the extent that the proposed SSL action redistributes effort (and pollock TAC amounts) into the late-spring and summer periods, and out of 'preferred' (e.g., nearer shore CH) areas, greater amounts of effort will be required to fully utilize the available TAC.

It is also widely reported (and apparently supported by catch data for periods following adoption of the SSL RPAs for this fishery) that Atka mackerel may be, in general, less readily available outside of areas designated as critical habitat in the Aleutians, where the fishery has traditionally been focused. The industry has asserted that CPUE for this fishery, in remaining open areas and during open periods, may be sufficiently reduced so as to make directed fishing uneconomical for some or all of the fleet. While this remains largely an empirical question, recent catch tends, especially in the western Aleutian's Atka mackerel target fishery, post-SSL RPAs, suggests that a significant portion of the TAC has not been harvested. For example, in the western AI area, in 1999, almost 40% of the Atka mackerel TAC was unharvested (approximately 9,200 mt). In 2000, there was an estimated 68% (approximately 18,800 mt) of the TAC left (again, in the western AI) when the trawl CH closure went into effect on September 7.[25] On the order of 88% and 90% of the apportioned TAC was harvested in the eastern and central Aleutian areas, respectively, in 2000 (leaving approximately 1,900 mt and 2,300 mt unharvested, respectively).

Platooning of the western and central AI Atka mackerel fleets

As part of its recommended SSL Protection Measure alternative (i.e., Alternative 4), the Council's RPA committee included a special programmatic provision, in response, at least in part, to the recent adverse experiences of the Atka mackerel fishing fleet, cited above (for a detailed treatment of this element, see Section 4.11.2 of the SEIS). That provision of Alternative 4 proposes a rather unique approach, under which a system of "platoon" management would be implemented for critical habitat fishing in Areas 542 and 543 (central and western AI). Assuming, as the proposal does, that the annual Atka mackerel TAC would be split into two equal season allocations (made available January 20 through April 15 and September 1 through November 1), and further that the TAC would be apportioned inside CH and outside CH in a 60% **:** 40% ratio, respectively (and no fishing for Atka mackerel would be allowed in CH east of 178 degrees W. longitude, which includes Area 541 and a small portion of eastern Area 542), vessels would be required to register with NMFS to fish scheduled A or B seasons. Each such vessel would be randomly assigned to one of two "platoons" (or teams) within an area. Each platoon would, in effect, be allotted half[26] of the available TAC "inside CH", for each of these two management areas, establishing two directed fisheries, per area, per season. Each platoon will be authorized to fish in the assigned directed fishery in an area for a time period dependent upon the respective area's TAC apportionment and the fishing capacity of the vessels in the platoon. A vessel may register and be randomly assigned to a platoon in both 542 and 543. Vessels registered to fish during a season in both 542 and 543 would switch areas after the closure of the first directed fishery.

According to representatives from this sector[27], this proposal represents a conscious operational and economic "trade-off" by the industry, in several respects. First, without these 'effort' and 'TAC' apportioning provisions (that slow the fishery and allow it to fish for more than the current 40% of TAC in CH), the available amount of harvestable mackerel would not be sufficient to support a commercial fishery, given the much reduced CPUEs outside of CH in the Central AI and Western AI management areas; high bycatch rates of rockfish outside CH (which will lead to premature closures of the directed fishery before the TAC is attained); and the catching capacity of the C/Ps which fish this resource. This would likely mean that some

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[25] It should also be noted that, non-CDQ trawling for Atka mackerel was closed in this management area for the rest of the 2000 fishing year, effective September 20, 2000, due to bycatch of sharpchin and northern rockfish.

[26] The "platoon's" TAC share would be proportional to the number of vessels in each platoon, if the numbers were not "equal".

[27] Per. comm., John Henderschedt, Groundfish Forum, Inc., June 26, 2001.

or all of this capacity would be displaced (again, according to informed sources[28]) into the flatfish fisheries, with significant and immediate adverse economic and structural implications for those existing fleets.

Second, platooning balances the need (desire) for a larger share of the mackerel TAC to come from CH, with the requirement that instantaneous effort and removal levels within CH, in any given statistical area, be controlled. Platooning, as recommended by the RPA Committee, helps to reduce effort levels in CH to approximately half of its maximum potential level, based on the number of vessels which choose to participate in a given opening, thus yielding the requisite SSL conservation and protection objectives which underlie the proposed SSL Protection Measure proposal.

A third example of the conscious economic "trade-off" being made by those supporting the Atka target "platooning" scheme, may be found in the way in which observer coverage requirements would be modified, under the provisions of Alternative 4. It is generally accepted that a higher level of observer coverage will be needed to provide data for effective in-season management of the fishery under the proposed platoon management scheme. In the words of a spokesman for those proposing a platoon system for this fishery, "Based on the industry's experience with earlier SSL CH closures and restrictions, the only way a viable fishery will be possible, especially given rockfish bycatch rates encountered outside of CH in 542 and 543, which likely will result in premature closures and even more foregone Atka TAC, is if a substantial portion of the area TAC's can be made available 'within' CH. To accomplish this, while simultaneously adhering to the SSL conservation constraints, the industry is willing to carry two observers, per vessel, during the entire period when CH is open to the Atka target fleet."[29]

This is not a trivial additional operating cost to impose on these vessels (see Section 1.3.5, which contains information on additional observer costs. Carrying two certified observers fully doubles the traditional fishery observer expenditures, for each vessel. The expectation is, however, that the value of access to the mackerel resource inside CH in management areas 542 and 543 (in terms of improved CPUE, bycatch avoidance, and thus increase potential for TAC attainment) will more than compensate~~s~~ for the additional observer outlays.

Costs of stand-downs and lay-ups

One of the fundamental tenets of the original effort to develop a Steller sea lion RPA proposal was the recognition of the need for temporal dispersion of effort, during the course of the fishing year. In this connection, it was proposed that TACs be seasonally apportioned, distributing available allowable catch among multiple and, most importantly, distinct seasons. In the latter regard, it was recognized that, to be effective, seasonal TAC releases must be separated by *meaningful* closed periods. That is, without mandatory and enforceable intervals of 'no fishing' between each scheduled opening, it was argued, it might be possible for the industry to strategically manage each release in such a way as to effectively combine two 'periodic' (e.g., quarterly) releases into a single extended fishing period. It was further asserted, by proponents of a strict temporal separation of seasons, that the potential to do this was enhanced in those areas, and for those fisheries, where the ability to fish "cooperatively" exists, within a given sector (e.g., EBS pollock inshore and at-sea sectors), so that the 'race-for-fish' can be (largely) avoided. The absence of this (or some other)

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[28] Per. comm., John Gauvin, Groundfish Forum, Inc., June 7, 2001 and September 17, 2001.

[29] Per. comm., John Gauvin, Groundfish Forum, Inc., September 20, 2001.

cooperative mechanism (e.g., in the GOA) probably diminishes the risk of this potential strategic behavior to near zero.

Nonetheless, any effective combination of TAC release would, it was argued, be in direct conflict with the stated objectives of the temporal dispersion principle for protecting Steller sea lions. This line of reasoning continues to be reflected (either implicitly or explicitly) in the current suite of SSL Protection Measure alternatives. Most directly, Alternative 2 prescribes (in combination with four seasons for pollock, Pacific cod, and Atka mackerel, each with equal seasonal TAC apportionments) a schedule of mandatory "two-week stand-downs ... between seasons, with no rollover of TAC allowed".

Whether formal "stand-downs" (as prescribed in Alternative 2) or widely separated TAC releases (as proposed under several of the other alternatives), from the perspective of the fishing industry, mandatory idle periods between openings impose costs. Clearly, the longer the duration of imposed idleness (and the more numerous these periods) the greater their potential economic and operational burden.

Presumably, there exists some form of a "step function" which characterizes these potential adverse impacts. That is, it may be likely that a mandatory stand-down of 24 hours, or 48 hours, or even 72 hours, would impose costs which could be readily absorbed by most operators participating in the pollock, Pacific cod, or Atka mackerel target fisheries (although all would likely prefer to avoid them). Indeed, over such a relatively brief interval, an operator might keep the crew productively employed with maintenance and/or other forms of preparation for the anticipated re-opening. Nonetheless, it is the case that over any such period, the plant or vessel must continue to pay its variable costs (e.g., wages and salaries, food and housing expenses, fuel and other "consumable" input costs, etc.) while producing no marketable output, and therefore earning no revenues.

Under such circumstances, at some point in time, each operator will reach a "break point", or threshold, beyond which the cost of "standing-by" becomes a significant economic burden. Precisely where this break point lies will likely vary, operation by operation. At present, no empirical information is available with which to predict when these thresholds might be attained by any given plant or vessel. However, when the threshold is reached, the operator will face a series of decisions with potentially significant economic costs and operational consequences.

These costs may be characterized as "staging expenses". For example, transporting crews, by air, to and from remote Alaska locations four times in a fishing year (rather than once or twice, as has historically been required) can represent a significant additional operating expense. In association with analysis of the Bering Sea Pollock/Steller RPA analysis, undertaken in late 1999 and early 2000, the At-sea Processors Association reported that each C/P which participates in the pollock target fishery carries a crew of 100 to 125 members. Motherships and inshore plants in that same fishery have at least as many transient employees. The Atka mackerel and Pacific cod target fisheries in both the BSAI and GOA, as well as the GOA pollock fishery, operate at a smaller scale, per operation, and thus have fewer employees per vessel, however, the total number of participating operations is vastly larger than in the EBS pollock fishery. Repeated movement of crew, on the scale suggested by these estimates, to and from staging areas in remote Alaska ports in response to stand down periods, clearly represent a potentially significant economic (and logistical) burden for these fleets (and plants).

Similarly, moving fishing supplies and support materials to and from the vessel's staging port (or onshore plant location) two or more times each season, as well as providing for secure stand-down status of the vessel (or plant) and its equipment between openings, could impose considerably higher operating costs (and thus smaller profit margins). Moorage slips, especially for the larger vessels in these fleets, may be in short supply, given the limited physical facilities which currently exist in ports and harbors adjacent to these fishing areas. If entire fleets must lay-up for weeks (or even longer periods) between openings, existing moorage facilities may be overwhelmed. Even if adequate space can be found, it is probable that rental/leasing costs for that space will be bid up significantly. In the long run, this induced demand may result in investment in additional port and harbor facilities. Should subsequent changes in fishing patterns occur which substantially reduce demand for transient stand down moorage, some or all of these investments may be stranded (i.e., become excess capacity).

As suggested, onshore plants could experience equivalent logistical costs, depending upon their relative level of operational diversification, geographic location, length of current operating season, etc. It may, in fact, be the case, as was reported in testimony before the Council at its December 2000 meeting, that volumes of fish available for processing from reduced seasonal TACs, or widely separated openings, may be insufficient to justify the start-up and operational costs; and some plants may simply choose not to participate in one or more of the SSL regulated fisheries (or openings). This would not only adversely affect the revenues of the plant, but could result in losses to the fishermen, if alternative markets for their catch could not be found. Presumably, there exists a balance-point between the minimum necessary volume of deliveries of catch to a plant, the duration of idleness between delivery flows, and the ability to operate a facility at all. While likely varying from plant to plant, operator to operator, even species to species delivered, it is clear that if a plant cannot cover its variable operating costs, it is better off (from an economic perspective) to cease operation, altogether. As staging cost (e.g., moving crews and supplies to and from the facility) increase, this operating margin shrinks. Data limitations preclude estimating which plants can (or will choose to) operate under any given set of scheduled TAC releases or associated stand-downs. It is apparent, however, that extended mandatory "stand-downs", or significant indirectly induced "lay-ups", between fishery openings (as provided for under several of the proposed SSL Protection Measure alternatives) will increase the likelihood that some may not.

Additionally, substantial operating losses may be expected to accompany these actions (i.e., those which impose strict "stand-down" periods or even significantly delayed openings of the target fishing seasons), especially if these coincided with periods when the targeted fish are at their peak economic value (e.g., during the height of the roe season, or late in the fall when fish size and flesh quality enhance fillet or surimi production, or otherwise increase market value).

It should be noted that the availability of community development quota (CDQ) for Atka mackerel, Pacific cod, and pollock in the BSAI management area(s) may enable operators with CDQ partners (or linkages) to bridge some portion of the "lay-up" periods that will inevitably occur when seasonal TAC apportionments are taken before the scheduled ending date of a given season. This mechanism may allow these operators to avoid some of the duplicative staging costs, associated with "lay-ups" between TAC releases, but likely, not all. Neither will this solution be available to all potentially affected operations. Furthermore, because the mandatory "stand-down" provisions, such as are contained in Alternative 2, do not provide for an exemption for CDQ fisheries, the operational staging costs imposed by mandated "stand-downs" will not be avoided or reduced by association with a CDQ group.

Impacts of Maximum Daily Catch Limits

Each of the proposed SSL Protection Measure alternatives under consideration by the Council rely upon some (more or less unique) combination of management tools to achieve the conservation objectives set out for this action. Among these are time and area closures, global control rules and strict TAC ceilings, season and sectoral allocations of TAC, vessel size and gear limitation, and VMS requirements. In addition to this list, Alternative 2 would include fishery and area specific 'maximum daily catch limits' in the management mix. While monitoring and enforcement considerations of such a provision are treated elsewhere in the analysis (see Section 4.11.2 of this SEIS), the purely economic implications of such limits require some attention here.

To place this issue in context, it must be acknowledged that the 'race-for-fish', induced by open access management in the U.S. EEZ (as elsewhere), has created a well documented range of problems for the development, exploitation, and conservation of the nation's living marine resources. Among these are tendencies for: (1) excess capacity and over-capitalization; (2) inefficiencies and waste in both the harvesting and processing of the target catch; (3) excessive bycatch of both non-target and "prohibited" species; (4) loss of product quality and consumer value, as the need to move large catch volumes through processing lines, at peak throughput rates, prevented use of techniques which could increase recovery, enhance product quality, and improve revenue flows; among other effects. While not unique to the BSAI and GOA groundfish fisheries, all these undesirable traits have been present in their recent histories (and many continue today).

Nonetheless, recent efforts have been made to reduce these open access induced 'tendencies', and in so doing, to increase the economic and operational efficiency of the harvesting and processing sectors (e.g., reduce waste, avoid bycatch, and improve product recovery rates and quality). The clearest example may be reflected in the fishing "co-operatives", provided for under the AFA, for both inshore and at-sea pollock operators in the BSAI. Other efforts, for example, informal agreements among operators to voluntarily move off bycatch 'hot spots', IR/IU, sablefish IFQs, etc., have contributed to movement (albeit, slight movement in some instances) towards a more "rationalized", more economically efficient commercial fishing sector.

In the face of both formal and informal efforts to slow and control the 'race-for-fish' (and with it, all the undesirable and inefficient aspects of 'open access' management) a regulatory provision which imposes "binding"[30] aggregate maximum daily catch limits on a fishery would tend, all else equal, to have exactly the opposite effect. That is, binding limits would tend to accelerate the race for access to the limited available catch, inducing behavior which would likely adversely affect operational efficiency, reduce recovery rates, diminish both the quality and quantity of output per unit of catch, restrict the variety of products supplied, and reduce incentives to avoid bycatch. If the maximum daily catch limits are sufficiently constraining, relative to the effective capacity in the fleet (at least in the short run), catch will once again go to the fastest, largest, most technologically sophisticated operations, at the direct and immediate expense of the smaller elements of the fleet.

In the limit, of course, if the maximum daily catch limits are too small to support a commercial fishery on a scale anything like those currently conducted (and to which the present harvesting and processing sectors are scaled), then either the available TAC will not be utilized (with all the adverse economic implications for consumers, fleet sectors, dependent communities, etc., discussed above), or, perhaps more likely, a much smaller fleet will ultimately emerge, scaled to the size of the available resource. This would not be an instantaneous, nor costless, transition. Among the myriad effects of such a down-scaling would be concerns about where the displaced capacity might migrate and with what economic and operational implications for those areas and fishing fleets (see also Section 1.3.4.5 Effects on related fisheries).

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[30] If the maximum daily catch limit was set at a level which exceeded the rate at which the fishery would be voluntarily prosecuted, it would, of course, result in no adverse modification of the fishing patterns and behavior of the fleet. Only in the case where the limit was "binding" (e.g., imposed limits below the rate at which the fishery would voluntarily be prosecuted) would economic and operational costs be imposed.

In conclusion, it appears that 'binding' maximum daily catch limits have the potential to counteract exiting regulatory and management efforts (e.g., AFA, IR/IU) to increase economic efficiency, reduce waste and improve utilization, enhance economic rationalization, and reduce the 'race-for-fish' in the BSAI and GOA pollock, Pacific cod, and Atka mackerel fisheries.

Potential gear conflicts

Concerns have been expressed, from a variety of sources, about the economic effects of forcing gear-specific effort out of 'traditional' operating areas and into proximity with other gear groups and/or target fisheries. Trawl gear, pot gear, and longline gear are incompatible, when fished simultaneously in a given area. Gear damage or loss is a common outcome when these competing fishing technologies come into contact with one another on the fishing grounds. Each gear group perceives itself as facing "unique" operating challenges, with respect to such conflicts.

For example, the Pacific cod pot harvesting sector has reported that it faces several problems and constraints, peculiar to successful prosecution of their fishery. Pot boats tend, reportedly, to set their gear very near shore, in generally small and well defined areas. According to informed sources[31], often, in practice, these are immediately adjacent to Steller sea lion rookeries and haulouts. For example, a major pot fishery has traditionally been prosecuted near the rookeries in Unimak Pass. The pot operators reportedly do this principally because of the high cost (and frequency) of gear conflicts with other gear operator (e.g., longliners, but especially trawlers) when the several gear groups attempt to fish the same waters. By voluntarily isolating themselves, in well defined and generally recognized specific areas, they insulate all from the high cost (and frustration) associated with gear conflicts.

A fully rigged Pacific cod pot costs $650.00, according to industry sources. Gear conflicts which result in the loss of even a single pot per day, or serious damage to even a small number of pots, can quickly exceed the value of the expected Pacific cod catch for an operator in this sector, industry members report.

Similarly, gear conflicts between trawls (targeting any species) and longlines impose damage, loss, and potentially significant costs to these other gear operators, as well. At present, as noted, pot gear operators tend to set in specific near-shore areas, known to trawlers and longliners. The other two gear groups reportedly routinely avoid those areas, intentionally in order to minimize the potential for gear conflict (and thus avoid the associated economic and operational cost of damage and loss). Should the proportionally substantial and geographically extensive portions of the nearshore areas be closed, as provided for in literally all of the proposed alternatives, the potential for gear conflicts (and associated economic loss) will increase, all else equal.

Recent reports from the BSAI opilio crab fishing sector suggest that these gear-conflict losses will not be exclusively a problem for the three groundfish target fisheries under discussion here. Indeed, RPA closures of Steller sea lion CH, during the first half of 2001, reportedly forced pollock CVs and C/Ps farther offshore, and into areas where crab pots were set. The reported gear conflicts were said to have resulted in very significant economic losses for the opilio crab pot operators, attributable to both severely damaged and lost pots, lines, and buoys.[32] This report (if accurate) provides direct empirical evidence of the kinds of adverse

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[31] Arni Thompson, "Personal Communication," December 2000.
[32] Captain Gary Cobban, Jr., "Personal Communication," F/V Rebel, P.O. Box 2441, Kodiak, AK 99615, 2/20/01 (email).

financial consequences (in the form of gear conflicts) which may accompany displacing effort from CH areas into areas traditionally utilized by other fishing sectors, gear groups, etc.

This suggests that an increased potential for gear conflicts may be an unanticipated result of imposing structural changes on these fisheries of the kind envisioned in the suite of SSL Protection Measure alternatives, because each, to varying degrees, closes nearshore areas to some or all of the primary gear-types utilized to harvest pollock, Pacific cod, and Atka mackerel. To the extent, then, that any combination of the pollock, cod, and/or Atka fisheries are pushed into proximity with one another (or, as suggested by the skipper of the opilio crab vessel, with gear operators targeting other commercial species) as area closures displace effort, potentially costly and disruptive adverse interactions among gear types may be expected.

Costs of fishing when other important fisheries are 'open'

A large part of the groundfish fleet that would be directly regulated by the SSL Protection Measure alternatives is made up of operationally diverse vessels, sequentially fishing a suite of fisheries over the course of the year. This operational diversification potentially increases the revenues available to the fishing operation, and distributes the overall risk (and fixed cost) of the fishing business over a broader base.

Under provisions contained in one or more of the proposed alternative actions which shift significant portions of the annual TAC releases for the three primary target species of concern (e.g., Alternative 2's provision for a strict four season apportionment of TAC, no rollovers, and 25% released in each season), vessel operators may be forced to choose between fishing later in the year than normal for pollock, cod, or Atka, or participating in other economically (and culturally) valuable fisheries (e.g., salmon). Traditionally, the scheduled openings of these alternative fisheries would not have been in substantial conflict with the target Pacific cod, pollock, or Atka mackerel fisheries. If the seasonal quotas and scheduled TAC releases, provided for under the various SSL alternatives, move substantial portions of the allowable catch out of the winter and into later seasons, when other economically important fisheries normally take place, vessel operators may have to give up the revenues from those other fisheries in order to fish for pollock, Pacific cod, and Atka mackerel (or forego participation in some or all of these groundfish fisheries). Lost revenues could be an important cost imposed on these diversified, multi-fishery components of the groundfish fleet. These lost revenues do not represent actual "out-of-pocket" dollar expenditures by the fishermen. Nevertheless, they reflect a real social cost that must be considered in a cost-benefit analysis. Unfortunately, they can be treated only qualitatively here, due to data constraints. (The reader is directed to Section 1.4.1, however, where information is presented pertaining to the 'relative' dependence of various segments of the pollock, cod, and Atka fleets on a range of alternative commercial fisheries.)

Among the clearest examples of this potential tradeoff may be the case of trawl vessels under 60 feet, which are active in (especially) the Pacific cod fishery (many of which fish from small ports along the Alaska Peninsula, e.g., Sand Point, King Cove, as well as from Kodiak and other ports in the GOA). These vessels are typically constructed primarily to meet the needs and regulatory limitations (58' LOA) for participation in the Alaska salmon seine fishery (thus, the common reference to this class of vessels as 'limit seiners'). Salmon seining is principally a summer fishing activity, but these vessel operators have increasingly diversified their operations to include cod fishing, in the early-spring and fall fisheries.
Small hook and line vessels, under 32 feet, from many of these same small ports, are another good example of the tendency of the fleet of vessels currently active in 'groundfish' (principally cod), to be operationally diversified. This particular fleet has traditionally been employed in the salmon gillnet fisheries, and is increasingly used for halibut fishing, as well as for the groundfish fisheries. Hook and line vessels from 33

feet to 59 feet are typically fished for salmon, crab, and halibut in the summer. (Northern Economics, pages 3.10-32, 3.10-36, 3.10-38).

To the extent that specific provisions of the several SSL alternatives significantly alter the size and timing of TAC release and scheduled openings, pushing pollock, Atka, and especially Pacific cod fishing into the summer, they would clearly increase the costs for these classes of operations. How these fleets might accommodate these changes is largely beyond the capabilities of this analysis to predict. However, given the traditionally substantially higher unit value of catches in the salmon, halibut, and even crab fisheries, it is likely that a significant portion of this sector of the fleet will exit the groundfish fisheries, at least during the summer portion of the fishing year. This may mean, either larger shares of the total groundfish catch will accrue to other elements of the fleet (redistribution from the smallest boats to larger vessels), or some portion of the available cod, pollock, or Atka TAC will not be taken (a net loss to the fishery and society).

Processors built for higher throughput

As, (1) fewer vessels (and/or gear types) participate in the directed fishery, (2) CPUE's decline, and (3) fishing is more geographically dispersed, the aggregate rate of catch may slow significantly. This implies that the rate of delivery to processors will also decline. Because existing processing plant capacity has been built, in many cases, for "peak through-put" (i.e., maximize the rate at which catch is received and processed, in response to the "race-for-fish" on the grounds), lower and slower deliveries may not supply sufficient quantities of raw fish for plants to operate profitably. That is, plants have been designed, configured, and operated to exploit 'economies-of-scale' in production (i.e., moving an optimal volume of fish through the processing plant at the most efficient, most cost effective rate, given the capacity of the facility and expectations of catch and delivery rates from the CV fleet). If operated at rates which significantly deviate from those for which the plant was designed, these "economies" are lost, and a plant may quickly become unprofitable to operate.

Indeed, anecdotal testimony before the Council, at the December 2000 meeting, suggested that some inshore processing plants might not find it operationally profitable to purchase and process groundfish, during some periods of the 2001 fishing season, because projected aggregate deliveries were too small, or the pace of deliveries was anticipated to be too slow, to justify plant operation. This is, of course, an empirical question, but if a plant cannot cover its variable operating costs (e.g., running at the reduced rate of CV deliveries and plant through-put, as projected by some), the operator would find it in the firm's economic interest to cease operation, altogether, rather than incur losses imposed by such inefficiencies.

Effects on plant operation and profitability, associated with 'economies-of-scale' considerations, could be further confounded by considerations of, for example, multiple plant start-up costs (made necessary by required 'stand-downs', or induced 'lay-ups' in the fisheries, i.e., no fish available for processing for extended periods); loss of access to significant portions of the TAC during periods of highest fish value (e.g., roe-bearing cod and pollock); and reduced quality of raw fish deliveries (e.g., as boats must travel greater distances, holding fish longer, or fish are in poorer physical condition during post-spawn recovery, etc.). Each of these considerations is addressed in greater detail, elsewhere in this analysis, however, the nature of these interactive and compounding relationships is important to keep in mind. None of these economic, operational, or logistical elements works in isolation from one another.

1.3.3.4 Safety Impacts

Commercial fishing is a dangerous occupation. Lincoln and Conway, of the National Institute of Occupational Safety and Health (NIOSH), estimate that, from 1991 to 1998, the occupational fatality rate in commercial fishing off Alaska was 116/100,000 (persons/full time equivalent jobs), or about 26 times the national average of 4.4/100,000.[33] Fatality rates were highest for the Bering Sea crab fisheries. Groundfish fishing fatality rates, at about 46/100,000 were the lowest of the major fisheries identified by Lincoln and Conway(Lincoln and Conway). Even this relatively lower rate was about ten times the national average (Lincoln and Conway, page 692-693).[34]

The danger inherent in commercial groundfish fishing was underscored by two accidents in March and April of 2001. In March, two men were lost when the 110 foot cod trawler Amber Dawn sank in a storm, near Atka Island. In April, 15 men were lost when the 103 foot trawler-processor Arctic Rose sank about 200 miles to the northwest of St. Paul Island in the Bering Sea, while fishing for flathead sole. Existing or proposed SSL measures were not a factor in either of these cases. The Amber Dawn was operating close to shore (within 10 miles) and the Arctic Rose was operating on traditional flathead sole grounds, the choice of which was not driven by SSL concerns.

However, during most of the 1990s, commercial fishing appeared to become (relatively) safer. While annual vessel accident rates remained comparatively stable, annual fatality per incident rates (case fatality rates) dropped. The result was an apparent decline in the annual occupational fatality rate.[35] From 1991 to 1994, the case fatality rate averaged 17.5% a year; from 1995 to 1998 the rate averaged 7.25% a year. Lincoln and Conway report that, “The reduction of deaths related to fishing since 1991 has been associated primarily with events that involve a vessel operating in any type of fishery other than crab.” (Lincoln and Conway, page 693.) Lincoln and Conway described their view of the source of the improvement in the following quotation.

“The impressive progress made during the 1990s, in reducing mortality from incidents related to fishing in Alaska, has occurred largely by reducing deaths after an event has occurred, primarily by keeping fishermen who have evacuated capsized (sic.) or sinking vessels afloat and warm (using immersion suits and life rafts), and by being able to locate them readily, through electronic position indicating radio beacons.” (Lincoln and Conway, page 694).

There could be many explanations for this improvement. Lincoln and Conway point to improvements in gear and training, flowing from provisions of the Commercial Fishing Industry Vessel Safety Act of 1988, that were implemented in the early 1990s. Other causes may be improvements in technology and in fisheries management. Technological improvements may include advances in Emergency Position Indicating Radio Beacon (EPIRB, sometimes also called an "ELT" or Emergency Locator Beacon) technology. Current 406 MHz EPIRBs are more effective as a means of communicating distress than the 121.5 MHz EPIRBs in use

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[33] To make accident rates easier to read and to compare across industries, all rates have been standardized in terms of the hypothetical numbers of accidents per 100,000 full time equivalent jobs in the business. The numerator, 116, is not the number of actual deaths; the denominator, 100,000, is probably at least five times the total number of full time equivalent jobs each year in the Alaska fishing industry. In decimal form, this is a rate of .00116.

[34] The NIOSH study does not cover 1999-2001. Results updated through 1999 should be published in the summer of 2001; however, these results are not available at this writing. (Lincoln, pers. comm.). The rates are based on an estimate of 17,400 full time employees active in the fisheries. This estimate of the employment base was assumed constant over the time period. However, various factors may have affected this base, including reductions in the size of the halibut and sablefish fleets due to the introduction of individual quotas. These estimates must therefore be treated as rough guides. The updated results due in the summer of 2001 should include an updated estimate of the number of full time equivalent employees, as well.

[35] This result is based on an examination of the years from 1991-1998. It does not reflect the losses in the winter of 2001.

in the early 1990s, in that they now transmit a unique identification code in addition to position information, which allows USCG personnel ashore to quickly identify the vessel, use point of contact telephone numbers, and more effectively filter out false alarms.

Fishery management improvements may include the introduction of individual quotas in the halibut and sablefish fisheries. The introduction of co-ops in the pollock fisheries in 1999 and 2000 would not be reflected in these statistics, but by rationalizing pollock fishing in the BSAI, they may lead to safety improvements.

The Lincoln-Conway study implies that safety can be affected by management changes that effect the vulnerability of fishing boats, and thus the number of incidents, and by management changes that effect the case fatality rate. These may include changes that affect the speed of response by other vessels and the USCG. Starting in 1997, the Coast Guard's Seventeenth District instituted a practice of forward deploying a long range search helicopter to Cold Bay, Alaska, to improve agency response time during the Bristol Bay red king crab fishery. This practice was expanded in 1998 to cover the Opilio crab fishery. In 1999, approximately 11 lives were saved, in a 6 day period of bad weather, when the forward deployed helicopter responded to several vessel sinkings and other marine casualties in short order.

Fishing farther offshore

Changes in fishery management regulations that result in vessels, particularly smaller vessels, operating farther offshore, appear likely to increase the risk of property loss, injury to crew members, and loss of life. Steller sea lion regulations that close (or severely restrict fishing in) nearshore critical habitat to operations targeting pollock, Pacific cod, and Atka mackerel, or other groundfish, could compel vessel operators to choose between assuming these increased risks or exiting these fisheries for some or all of the fishing season.

Weather and ocean conditions, especially in the BSAI, but also in the GOA, are among the most extreme in the world. The region is remote, sparsely populated, with relatively few developed ports, and the groundfish fisheries are conducted over vast geographic areas. While many vessels in these fisheries are large and technologically sophisticated, many more are relatively small vessels with limited operational ranges. Smaller vessels may be at risk in the summer, as well as in the winter. As the Council's RPA committee noted in its April 2001 minutes, "*Although summer weather in the Bering Sea is certainly less threatening than winter weather, smaller boats are at risk when they must travel far from land and far from processing facilities.*" (One, presumably, can make the same observation about elements of these fisheries in the central and western GOA, as well).

Several factors associated with fishing farther from shore can reduce the safety of fishing operations by increasing the likelihood of emergency incidents. Vessels will probably have to spend more time at sea in order to take a given amount of fish. It will take more time to travel between port and the fishing grounds. Operations are also likely to be fishing in less familiar conditions and on stocks that may be less highly aggregated, thus reducing CPUE. Increases in the time spent at sea increase the length of time fishermen are potentially exposed to accidents. Furthermore, longer trips are likely to increase fatigue and thus the potential for mistakes and accidents.

Other factors may tend to increase the case fatality rate. Fishing vessels will be farther from help if an accident occurs. In many cases, the initial response to trouble comes from other fishermen. If fishing farther offshore, on more extensive fishing grounds, increases the dispersion of the fishing fleet, assistance from other fishermen may not be as readily available. In addition, regulatory actions that force fishing vessels to work farther offshore may turn what would normally have been a "request for assistance" search and rescue

(SAR) case into an emergency or life threatening situation. Many SAR cases, involving fatalities, start as a casualty to the vessel that degrades its stability or survivability, but does not immediately threaten the vessel or crew. After the initial casualty, other environmental factors (e.g., heavy seas, winds, freezing spray, etc.) may quickly cause the situation to deteriorate. The ability to render assistance early is essential. Vessels fishing farther from shore and/or in more remote locations may experience additional delays before help can arrive. In a similar respect, the ability to satisfactorily treat personnel injuries is often determined by the speed with which that person can receive adequate medical attention.

While these factors may affect all operations, they are likely to be most serious for the smaller vessels, based in Alaska ports, that have tended to fish relatively close to the shore, in the past. For example, it is reported that small vessels operating out of Kodiak or Alaska Peninsula communities typically seek at least 48 hours of stable weather to initiate a Pacific cod trip. This 48 hour window of opportunity allows a run from port, time spent fishing, and time for returning to port. The "weather window" is often attainable between the steady series of low pressure system storms that pass through the region from West to East, at all times of the year (with greater frequency and severity in the winter). With the combined effects of a longer run to fish in more distant waters, plus longer fishing times caused by reduced catch rates, a much longer window of opportunity to conduct a fishing trip will be required.

The effect of this new situation may vary. It may result in fewer trips and lowered harvest levels for Pacific cod, because there are likely to be fewer good weather periods of longer duration. However, as noted below, fishing vessel owners will face economic pressures on their fishing operations due to diminished revenues and increased costs. There is a reasonable likelihood for a tendency to try and 'squeeze' longer trips into marginal weather conditions. The result of this new fishing pattern will be an increased level of risk to vessels and crews, albeit an increase which cannot be empirically estimated, *a priori*.

Reduced profitability

As discussed throughout Section 1.3.3 of this RIR, proposed restrictions on fishing to protect Steller sea lions and their critical habitat may reduce the profitability of many operations, including many of the smaller operations. Reduced profitability may be an indirect cause of higher accident rates. Fishermen facing a profit squeeze may defer needed maintenance on vessels and equipment. They may reduce operating costs by cutting back on safety expenditures. They may scale back the size of their crew in order to reduce crew share expenses. Remaining crew would have expanded responsibilities and could risk greater fatigue, increasing the likelihood of accidents. Finally, these operators may find it necessary to fish more aggressively, even in marginal conditions, in an effort to recoup lost revenues. These factors may affect the incident rate and the case fatality rate.

Changes in risk from the alternatives

Each of the factors described above increase risk. To some extent, the potential for increased risk may be offset by changes in fleet behavior. An increase in risk effectively increases the cost of each additional day of fishing and may contribute to reduced fishing days by smaller vessels. If this leads to a safety induced reallocation of harvest from smaller to larger vessels, risk calculations may be affected. Smaller crew sizes mean that fewer people on a vessel are exposed to danger. Skippers who have less invested in safety gear may have an incentive to behave more cautiously or conservatively in other respects, in order to offset some of their perceived increased risk.[36]

Very little is known about factors that might increase risk, or that might offset risk increases, for fishermen in the North Pacific and Bering Sea. Even the best estimates of statistics as fundamental as the occupational fatality rate are not precise and are not available at all for recent years. Rough estimates of the relative ranking of occupational fatality rates in different fisheries are known, however, little more than qualitative speculation is available on the factors that affect the rates in the different fisheries. Available information does not permit quantitative modeling of changes in these rates in response to changes in fishery management regulations. In the present instance, the proposed SSL Protection Measures could push fishing activity, by a given vessel class, beyond the range of activity observed in the past. Vessels may be forced to fish in areas where little fishing effort has traditionally occurred and, until experience is gained in these areas, the implications for operational safety will be unknown. The actual net impact of the suite of proposed operational changes, measured in increased incident rates, and increased case fatality rates, cannot be determined.

For these reasons, it is impossible to make numerical estimates of the changes in the occupational fatality rates that would be caused by the different alternatives.[37] The following discussion of changes in risk, while qualitative, is associated with the mechanisms discussed above: (a) an alternative that tends to force operations (particularly smaller operations) farther off shore and/or requires that longer distances be transited between ‘open’ fishing grounds and delivery/home ports will be deemed to impose more risk; (b) alternatives that put more pressure on profits and cash flow (particularly for smaller operations) will be assume to impose more risk.

Evidence from the simulation model (used to estimate the potential exposure of the different fleets to reductions in their gross revenues from the suite of SSL alternatives) may also be used to address the relative risk to fishermen imposed by these five alternatives. On the basis of these results, Alternative 4 seems less likely than any of the remaining alternatives to the status quo to reduce operational profitability and to push fishermen off of their accustomed fishing grounds. This alternative appears to reduce some (although not all) of the more onerous aspects of Alternatives 2, 3, and 5, with respect to the proximity of open fishing areas and operating ports. It specifically contains provisions which reduce some requirements which otherwise would force effort farther offshore, especially for the smaller segments of the SSL Protection Measure regulated fleets. For example, Alternative 4 proposes to incorporate existing ‘exemption’ provisions (originally adopted as part of the American Fisheries Act), which were intended to accommodate the physical and operational limitations of pollock catcher vessels, delivering inshore in the EBS, during the parts of the fishing year when weather and ocean conditions are most severe. Under this proposed provision of Alternative 4, NMFS will monitor catch (by sector) and close the SCA to directed fishing for pollock, by any given industry sector, when NMFS determines that its specified SCA limit has been reached. However, inshore catcher vessels less than or equal to 99' (30.2 m) LOA would be exempt from SCA closures during the fall and winter months unless the cap for the inshore sector has been attained. To achieve this management result, NMFS has separated the inshore fishery into ‘cooperative’ and ‘non-cooperative’ sector allocations. For each sector, NMFS announces the closure of the SCA to catcher vessels over 99' (30.2 m) LOA, before the inshore sector SCA limit is reached. In this way, NMFS seeks to implement the closure in a manner intended to leave sufficient remaining quota within the SCA to support directed fishing for pollock

[36]As noted above, reduced profitability may provide an incentive for more aggressive fishing. The existence of both incentives in not self-contradictory. It is hard to determine their relative magnitudes and ultimate result.

[37]Although the focus in this discussion is on occupational fatality rates, fishermen risk injury and property loss, as well.

by vessels less than or equal to 99' (30.2 m) LOA, for the duration of the inshore sector opening. As provided for under AFA, this element of Alternative 4, if adopted, will be in force during the fall and winter seasons only, and is justified solely on the basis of vessel safety considerations, during the time periods of most extreme operating conditions in this management area.

By adopting this and other special ‘exemption’ provisions, recognizing the differing physical and operational capabilities of the smaller elements of the effected fishing fleets, Alternative 4 likely imposes a relatively lower risk of accident and injury, to the extent that occurrence of accidents are highly correlated with seasonality, fishing distances offshore, vessel size, etc., than does any of the other alternatives to the ‘no action’ alternative.

Alternatives 3 and 5 are very similar in structure, and therefore share many attributes in terms of their expected impacts on the “safety” criterion. Both, for example, rely heavily on time and area restrictions, TAC reapportionments, and CH closures, which would substantially alter the duration, location, and timing of these fisheries, as compared to traditional patterns. Both, therefore, are equally likely to present a high potential to increase risk of accident and injury, if adopted.

Alternative 2 would likely result in the largest structural change to the baseline operational patterns of these fisheries. This alternative, if adopted, would: (1) impose management restrictions requiring vessel operators to transit substantially greater distances between port and open fishing grounds; (2) likely displace fishing activity farther offshore than has traditionally been the case; and (3) aggravate the open access “race-for-fish”, with all its associated economic and operational perils. Alternative 2 also contains an absolute CH trawling ban provision which, in and of itself, substantially extends the distribution of potential risk and injury, beyond the pollock, Pacific cod, and Atka mackerel fleets, to which all the other alternatives limit themselves.

One could, perhaps, argue that this alternative, through its provisions for very significantly reducing TACs and extremely restrictive daily catch limits (which in combination may preclude managers from opening some areas to fishing), actually will so dramatically reduce fishing vessel days of operation, that it may result in an effective “risk reduction”, in terms of accident and injury. This may, however, be a classic example of a “back-handed compliment”. While Alternative 2 does contain several provisions which either directly or indirectly offer a modicum of relief for the smallest elements of the effected fleets, it probably imposes additional risk of accident and injury only slightly smaller than those associated with Alternatives 3 and 5.

Role of the U.S. Coast Guard

In Alaska, the Coast Guard primarily responds to SAR cases with helicopters, fixed-wing aircraft, and the medium and high endurance cutters, assigned to patrol the area. Coast Guard aircraft normally provide the initial response for emergency SAR cases in Alaska. Coast Guard aircraft in western Alaska operate from Air Station Kodiak on Kodiak Island, but may also be deployed from patrolling cutters or from forward deployment sites at Cold Bay, St. Paul, and other remote locations in the region. The same aircraft and cutters that respond to SAR emergencies, also carry out the Services’ other operational missions, such as fisheries law enforcement and marine environmental protection. While the number of aircraft assigned to Kodiak has remained stable for the past decade, fixed-wing aircraft operating hours have declined by about 40%. The number of medium and high endurance cutters-days assigned to the fishery law enforcement mission in the BSAI and GOA has declined by 40% in the last 6 years.

SAR is the Coast Guard’s primary mission in Alaska, and it takes priority over other missions. To date, the ability of the service to respond to SAR within its internal response requirements has been maintained in

Alaska, despite an overall reduction of funding at the national level. This reduction of funding translates to a loss of operating hours for aircraft and operating days for cutters at the Alaska regional level. The Service's SAR response capabilities have been maintained, while reducing the resources available to conduct other missions.

The effect of requiring fishing vessels to work farther offshore, may or may not increase the frequency of their need for Coast Guard assistance. It would likely, however, increase the severity of many of those SAR cases that do occur, which will cause the Coast Guard to expend more of its resources to that mission. The Coast Guard response to vessels and fishermen in grave danger is greater and quicker than to a routine notification of breakdown/non-emergency distress. For example, a fishing vessel that becomes disabled while fishing in sheltered waters, close to shore, may notify the Coast Guard and arrange, itself, for a nearby vessel to assist or tow it to port. The Coast Guard would maintain communications with the vessel to monitor the situation, and may divert a cutter , if one was within a realistic response range, to escort. That same vessel, disabled further offshore is at greater risk, may be farther from assistance, is more exposed to weather, and will likely require a greater response from the Coast Guard, including the launching of aircraft.

1.3.3.5 Impacts on Related Fisheries

Changes induced by the SSL Protection Measures in the pollock, Pacific cod, and Atka mackerel target fisheries may have impacts on other fisheries (beyond the gear conflict issue addressed earlier). Some of these impacts may impose costs on these other fisheries. Among the possibilities identified are:

- Increases in non-target catches of cod and pollock
- Effects of displacing capacity
- Increased cost of gearing up
- Topping off behavior
- Increased bait costs in crab fisheries

Displacement of target catch

Under provisions of the previously cited IR/IU [38] regulations, even operations which are targeting groundfish species other than pollock or Pacific cod, must nonetheless retain 100% of their pollock and cod bycatches, up to an amount of each, equal to 20% of the retained catch of groundfish species, other than cod or pollock, onboard (i.e., 'maximum retainable bycatch' or MRB levels). The intent of this requirement was to eliminate 'economic' discarding of Pacific cod and pollock, and reduce, to the maximum extent consistent with management requirements, 'regulatory' discards of these species.

It is possible that actions which are taken in connection with the current proposed SSL action could have unanticipated (and undesirable) economic impacts for other groundfish fisheries, in connection with the interplay of IR/IU and the proposed SSL Protection alternatives. As an example, if substantial portions of the TAC for pollock and/or Pacific cod, in particular, were not harvested in the directed fisheries (perhaps because of considerably reduced CPUE, or conflicting season openings), bycatch rates of these species in fisheries for other groundfish may increase. Because, under IR/IU rules, all pollock and cod must be retained

[38] The Improved Retention/Improved Utilization amendments were implemented in the BSAI and GOA groundfish fisheries in January, 1998, and set out (relatively) ambitious goals for reducing bycatch discards and increasing utilization. Under the law's provisions, those operations which are targeting pollock and cod must also retain 100% of their cod and pollock catches (with a few specific exceptions).

(at least up to MRB levels), these bycatches will, by necessity, displace hold space intended for the 'target' species. In some cases, the value of the retained bycatch may exceed that of the target species, in which case, the operator may (depending on market access) benefit from the increased abundance of the bycatch species.[39] In other situations, however, inflated rates of bycatch of cod, and especially pollock, which must be retained, will imposed costs that the operator targeting other species of groundfish will be unable to avoid. In addition to displacing target catch in the holds, increases in operating costs associated with handling (e.g., sorting), processing, and holding product forms for which the operation is not primarily configured, may be substantial.

For example, it has been widely reported that bycatch of pollock is significant (and largely unavoidable) in many groundfish trawl fisheries. It is the case for some operations that retention of incidentally-caught pollock will impose significant costs on the harvesting vessel (e.g., Pacific cod H&G vessels) by displacing more valuable target species in the limited available hold space of these boats. To the extent that adoption of the SSL Protection Measure action results in geographic and/or temporal dispersion of effort in the directed pollock fishery, producing higher rates of bycatch of pollock in non-target fisheries which may continue to fish in areas from which (and at times when) the pollock fishery has been excluded, operational costs may be imposed.

Bycatches of Pacific cod are, similarly, significant and largely unavoidable in many groundfish trawl fisheries. To the extent that adoption of the SSL Protection Measure action results in geographic and/or temporal dispersion of effort targeting cod, producing higher rates of bycatch of Pacific cod in non-target fisheries which may continue to fish in areas (and at times) from which the cod fishery has been excluded, higher operating costs may be imposed on these non-Pacific cod target groundfish sectors. Whether these costs are offset by the value of the retained IR/IU fish (i.e., cod and pollock) will depend on a number of factors. These include (among others), the condition of the cod and/or pollock bycatch (e.g., 'summer' fish are generally of lower quality, and Pacific cod or pollock taken in a 'codend' of flatfish are reported to be in very poor physical condition); the holding and/or processing capability of the intercepting vessel; the duration of the fishing trip for the 'target' species (i.e., how long the pollock and/or cod bycatch must be held before offloading); and the nature and availability of a market for the resulting pollock or Pacific cod output.

The marketplace will largely determine whether, and by how much, retaining incidentally-caught pollock and Pacific cod are an economic and operational burden to vessels fishing other groundfish species. According to industry sources, headed and gutted (H&G) pollock, which was characterized as having "no economic value whatsoever", during the IR/IU debate, subsequently found a 'profitable' market, albeit only briefly.[40] Since that time, H&G pollock has cycled between being marketable and being unmarketable, several times. Currently, H&G pollock prices are "below the cost of production.... although there is always hope that markets for this product will rebound, in the future".[41]

These markets are volatile and this new information suggests that the hypothesized "spill over" effect may be of real economic and operational concern, should bycatch rates increase, as a result of the proposed action.

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[39] It is, in point of fact, fairly common practice in some fisheries (e.g., flatfish) for an operator to complete his or her fishing trip by 'topping off' the target catch with Pacific cod, up to the MRB limit, thus increasing the total landed value for the trip.
[40] Teressa Kandianis, "Personal Communication," Kodiak Fish Company, 2977 Fox Road, Ferndale, WA 98248, April 1999
[41] Teressa Kandianis,"Personal Communication," March 19, 2001

Effects of displacing capacity

While AFA sideboard provisions and LLP constraints seek to manage and control transference of effort and capacity across fisheries, they are not absolute barriers to this phenomenon. Indeed, it is reported that, should TACs (or area apportionments thereof) be too constraining to support existing levels of effort, it is probable that effectively displaced capacity will redistribute to remaining 'open' target fisheries, imposing significant costs upon the fleets that currently prosecute them. The principal example cited for this outcome, within the current SSL context, involves the Atka mackerel and flatfish fisheries. At present, the Atka mackerel target fishery is prosecuted by eight moderate sized catcher processors. Should the final SSL action contain provisions which substantially reduce the TAC of mackerel (e.g., the Alternative 2 requirement that mackerel TAC not exceed 33.3% of maximum ABC, with a daily catch limit of 300 mt.), industry sources predict that this fishery would cease to exist, for all practical purposes. That is, a dramatically reduced TAC, widely separated season releases, highly restrictive daily catch limits, and/or very limited allowances for fishing in CH, could not support the eight boats which presently constitute the Atka fleet. Most, if not all of these C/P vessels, it is predicted, would be compelled to forego an Atka mackerel target fishery and, instead, shift into the flatfish fisheries.

If this were to occur, these eight vessels would represent a huge potential capacity increase (e.g., estimated to fully 'double' the existing capacity in the flatfish fishery); they would likely displace current participating vessels (many of which are smaller and less operationally efficient than the Atka mackerel C/Ps, so would be 'out competed' on the grounds); and they could severely aggravate the existing race-for-fish in this fishery.

With substantially greater effort brought to bear on the available flatfish resource, daily aggregate catch rates would presumably rise substantially. This has a two-fold potential consequence. First, with the potential for fully a 100% increase in current fishing capacity in the flatfish fishing sector, for any given flatfish TAC, each vessel's 'share' would, by necessity, be smaller, all else equal. But, if these eight boats are indeed more operationally efficient, all else will not be equal, and it is likely they will take a proportionally larger share of the total catch, imposing even greater losses on the current flatfish fleet members.

Second, as noted, with this degree of additional capacity and associated effort, the 'race-for-fish' will be intensified. Traditionally, PSC bycatch (especially halibut) has been a limiting factor in attaining the various flatfish TACs, both in the BSAI and GOA regions.[42] With a significantly intensified flatfish fishery, considerations like PSC bycatch avoidance (e.g., moving off 'hot spots') will be less likely to influence fishing behavior. In effect, with more vessels, fishing more aggressively (i.e., less efficiently in the aggregate), there will be less room under the PSC cap to take the flatfish TAC and the fishery may be closed earlier. In effect, in addition to 'dividing the pie' among a greater number of vessels, accelerated rates of PSC bycatch could substantially reduce the 'size of the pie', in total, leaving all concerned less well off.

Increased costs of gearing up

In business planning, uncertainty imposes costs. It is likely that a number of elements contained in the suite of alternatives under consideration as part of the proposed SSL action will impose a degree of operational uncertainty on the fishing sectors, which may result in alteration of employment patterns and opportunities in the commercial fisheries, the processing sector, as well as in support and service sectors throughout the Central and Western Gulf, Aleutian Islands, and Eastern Bering Sea. Because crews are traditionally drawn

[42] Andy Smoker, "Personal Communication," July 18, 2001.

from an even wider geographic region, these effects may, in fact, extend well beyond western Alaska (e.g., the Puget Sound and greater Pacific Northwest of the United States). Anecdotal information, provided in testimony at the December 2000 NPFMC, indicated that the uncertainty surrounding the 2001 pollock, Pacific cod, and Atka mackerel fishing seasons (in connection with the RPA debate) had, at that time, resulted in a number of delays in hiring fishing and processing crews, increasing the operating cost of affected firms, and imposing hardships on prospective employees (and, by extension, their families and communities).

One vessel operator testified before the Council at that meeting that, owing to widespread uncertainty surrounding the Steller action, and especially projected small CH quotas provided under the proposed RPA, he had not hired his crew for the 2001 fishery. By that time in the fishing cycle, he reported, he normally would have extended offers to crew members, made travel arrangements for all, purchased bait and other provisions, and would have been in final preparation for the opening. At the time of his testimony, he had done none of these things. He reported further that, should he subsequently "gear-up" to fish, the cost of doing so would be much higher than normal (e.g., bait prices on the 'spot market' are significantly higher than 'contracted' supplies, discounted airfares based upon advanced purchase were no longer an option, etc.). This pattern may be the "norm" (at least in the short run, as the industry makes necessary adjustments to a new SSL regulatory environment) for many operators, faced with the structural changes in these fisheries which may be imposed as part of the Council's SSL Protection Measure action, whatever its final form.

The degree to which these potential adverse effects are actually realized cannot be assessed, *a priori*. They, nonetheless, represent potentially significant sources of economic uncertainty and operational disruption for these fisheries and dependent coastal communities.

Topping off fishery

There may, reportedly, be another "spill-over" effect attributable to the SSL Protection Measure action, which is somewhat unique to the GOA management area. Industry sources familiar with this region suggest that, in the GOA, one potential response to the proposed SSL Protection Measures, specifically as it pertains to Pacific cod, may be a tendency for the industry to shift away from a "directed" Pacific cod fishery, and towards a "topping-off" bycatch fishery for this species (thus, avoiding the more onerous operational burdens and constraints associated with the Steller sea lion regulatory action, while continuing to exploit Pacific cod, albeit at the MRB 20% rate). The extent to which this is economically feasible is an empirical question. However, the GOA groundfish fisheries tend, on average, to be much more "mixed" target and diverse than, say, are the EBS groundfish fisheries.

Increased bait costs in crab fisheries

Another element of this discussion of 'attributable economic costs' pertains to the reported practice, by many operators of Pacific cod pot vessels, of taking cod early in the calendar year for use by these same operations as bait, for their subsequent crab fisheries. Industry sources suggest that over half of the combination crab/Pacific cod fleet (on the order of 125 boats) depend operationally and economically upon the ability to "bait fish" cod, before the crab opening(s). Loss of this source of high quality "fresh" bait would, they submit, have a very significant adverse impact on crab CPUE, operating costs and, thus, economic value of the crab fisheries these vessels participate in.

Frozen bait is said to be significantly inferior to "fresh" Pacific cod, and costs roughly $0.50/lb, "...when it is available".[43] An average crab trip for this fleet is seven to ten days in duration, during which time each vessel typically use 8,000 pounds of bait (ca. $4,000 per vessel, per trip, bait replacement cost). While Pacific cod taken for "own-use bait" purposes is not landed, processed, or sold, it does represent an economically important "product form" for this segment of the industry, which could be put at risk under provisions of several of the proposed SSL alternatives to the status quo.

"Own-use bait" simultaneously represents a potentially significant source of Pacific cod removal that is largely unaccounted for, by current landings recording methods. Determining the amount of Pacific cod that is harvested for bait, but not reported, is difficult. Amendment 46 to the BSAI FMP attempted to provide a rough estimate. Two different methodologies were used to make those calculations. The first looked at "bycatch" of Pacific cod in crab fisheries (NPFMC 1996). It was assumed that those bycaught fish would be used, by the catching vessel, as bait in subsequent sets. Estimates indicated that 8,452 mt and 5,428 mt of Pacific cod were taken during the years 1994 and 1995, respectively. These estimates were made by assuming that the average cod taken as bycatch in these crab fisheries weighed 10 pounds, and the number of fish were multiplied by the assumed average weight.

The second method assumed that 10 pounds of bait cod were used for each crab pot pull that occurred in the BSAI (NPFMC 1996). During 1993, 2.7 million pot pulls were reported in the BSAI crab fishery. That equates to about 12,000 mt of bait. Fewer pots were pulled during the 1996 and 1997 BSAI crab fisheries. During those years, 1.2 million and 1.3 million pots were pulled. So, less than half the amount (5,500 mt to 6,000 mt) of bait was calculated to have been utilized in these years. Given these estimates of the amount of bait used, it appears that much of the bait harvested by fixed gear vessels is not reported. However, the projections referenced here might be regarded as an upper-bound estimate, because, presumably, not all bait used in the crab fisheries is Pacific cod, and not all cod bait is caught by the vessel using it (e.g., 'bait' is commercially targeted, landed, and sold for use in crab fisheries and therefore would be accounted for in catch estimates).

1.3.3.6 Summary of Impacts on Industry Revenues and Costs

Changes in industry revenues and costs have been discussed under five general headings.

- revenue change from output level
- revenue change from quality composition
- increased operating costs
- safety considerations
- impacts on related fisheries

It is anticipated that reductions in production, shifts in product mix, and potential deterioration in product quality may lead to reductions in industry revenues, under various provisions contained among the suite of alternatives of the SSL Protection Measure action. These revenue losses could be offset, to an unknown extent, by increases in prices received per unit of production, depending upon the underlying nature of demand for these outputs (see Appendix D, Market Analysis of Alaska Groundfish Fisheries).

If the SSL action ultimately adopted by the Council significantly reduces the quantity of fish harvested and processed, it could lead to some savings in production costs. However, it is also expected that the cost of

[43] Lance Farr, "Personal Communication,"8941 179th Place SW, Edmonds, WA 98026, July 7, 2000.

taking the remaining harvest will rise. There are a number of reasons for this. Some of these include the increased costs of travel between more distant fishing grounds and delivery/processing ports; reduced CPUE (owing to unaccustomed fishing grounds, smaller fish, or disaggregated schools); increased costs of bycatch avoidance measures or the loss of TAC if bycatch avoidance measures are unsuccessful or inadequate; potential gear conflicts; and the increased opportunity costs of fishing for pollock, cod, or Atka when other economically important fisheries (e.g., halibut, salmon) are open. The increased risk of property loss, crew member injury, or fishing fatalities also imposes an important potential cost, attributable to modifications imposed by adoption of SSL Protection Measures in the BSAI and GOA pollock, cod, and Atka mackerel fisheries.

Most of the foregoing economic and operational impacts cannot be readily quantified, given available data sources. Nonetheless, they represent real costs, appropriately attributed to the proposed SSL Protection Measures action. In the case of (potential) 'gross revenue' impacts, it has been possible to make quantitative estimates of the differential effects of the competing alternatives, albeit under a strict series of "simplifying" assumptions.

Notwithstanding these caveats and the analyst's best efforts, projections of gross product value effects may still be biased for a variety of reasons. For example, if the proposed action results in substantial reductions in the quantity of production of pollock, Pacific cod, and/or Atka mackerel, product prices independent of changes in quality might be expected to increase. Increases in prices (and the extent to which they offset the decreases in quantity) depend on demand elasticities, of which there is uncertain. While the model implicitly assumes a constant product mix, processors might reasonably be expected to alter product mix (although in unknown patterns) to maximize changes in relative product prices, or differential responses among "markets" (e.g., foreign versus domestic) which might tend to further offset effects of reductions in quantities. Countering these influences may be sacrifices in processing efficiencies, associated with loss of 'economies-of-scale', as plants designed and configured for one set of operating parameters must be employed to accommodate a dramatically different one. All these factors argue for 'care' in interpreting the gross revenue impact estimates, although they currently reflect "the best information available" on this subject.

1.3.4 Costs to Consumers from Changes in Groundfish Production

Ultimately, fish are harvested, processed, and delivered to market because consumers place a value on them, over and above what they have to pay to buy them.[44] A person who buys something, often would have been willing to pay more than they did for the good. The difference between what they would have been willing to pay and what they had to pay is treated by economists as an approximation of the value the good has to the consumer and as one component of its social value.

If the price of the good rises, the size of this benefit will be reduced, all else equal. If the amount of the good available for consumption is reduced, the size of this benefit is also reduced.[45] Provisions of the proposed SSL action are likely to reduce the value consumers receive from the fishery, for several reasons: (1)

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[44] Economists refer to this value as a "consumers' surplus." This is a key category in cost and benefit analysis. It is measured as the area under the (compensated) demand curve for a good and above the market clearing price that must be paid for it. It approximates the amount of satisfaction consumers get from consuming a good at a certain price.

[45] As previously noted, under guidance from the U.S. Office of Management and Budget, measurement of the change in consumer surpluses, associated with a proposed U.S. fishery management action, should not include any changes in welfare experienced by foreign consumers (e.g., Japanese consumers of surimi products).

consumers may be supplied fewer fish products; (2) consumers may have to pay a higher price for the fish products they do consume; (3) various factors may reduce the quality of fish supplied by the fishing industry and, thus, the value consumers place on (and receive from) them.

The (domestic) consumer losses will fall into two parts. One part, corresponding to the loss of benefits from fish products that are no longer produced, will be a total loss to society. This is often referred to as a "deadweight" loss. The second part, corresponding to a reduction in consumer benefits, because consumers will have to pay higher prices for the fish they continue to buy, will be offset by a corresponding increase in revenues to industry (i.e., producers' surplus gains). This second part should not be treated as a "loss to society". It is a measure of the benefit that consumers used to enjoy, but which now accrues to industry, in the form of increased prices and additional revenues.

The deadweight loss cannot be measured with current information about the fishery. Estimation would require better empirical information about domestic consumption of the different groundfish species and products, and information about the responsiveness of consumers to the reduction in the supply (e.g., their willingness and ability to 'substitute' other available sources of protein).

The second part of the loss in consumer surplus consists of a transfer from consumers to producers, due to the higher prices consumers would pay, when supplies of pollock, Pacific cod, and Atka mackerel products were reduced. As just suggested, this transfer is not a net loss from a social cost-benefit perspective.

Consumers may, however, incur losses from impacts in addition to the change in the volume of fish that are harvested and supplied to the market. As discussed above (see section 1.3.4.2), the SSL Protection Measure regulatory action may lead to reductions in product quality, as well as changes in product mix. This will also lead to reductions in the value consumers receive from consuming these seafood products. The welfare loss to consumers from this source cannot currently be estimated.

1.3.5 Management and Enforcement Costs

Management and enforcement considerations, as they pertain to groundfish fisheries in the EEZ off Alaska, are treated in detail in Sections 2.3, 3.11, and 4.11 of this SEIS. The reader is referred to that section for detailed discussions.

In terms of both management and enforcement costs, NMFS anticipates that Alternatives 2, 3, 4, and 5 would require increases in staff and budget for NMFS Enforcement and the In-Season Management Branch of the Alaska Regional Office's Sustainable Fisheries Division. The alternatives would all require increased enforcement of complex closed areas, directed fisheries, and would require management of additional quotas. In addition, Alternatives 2 and 4 involve implementation of new management systems that require pre-registration and authorization by NMFS for seasonal exclusive registration areas (Alternative 2) or pre-registration for the Atka mackerel fishery (Alternative 4). Although the alternatives would affect fishery monitoring efforts of the U.S. Coast Guard as well, that agency considers all activities to support the groundfish fisheries off Alaska as part of a national budget and did not estimate additional costs associated with these alternatives.

Additional NMFS enforcement and in-season management costs

NMFS monitors harvests during the year and closes fisheries in response to attainment of a TAC or TAC apportionment, harvest of a prohibited species bycatch allowance, or harvest of an incidentally caught species limit. Alternatives 2, 3, 4, and 5 rely heavily on time and area closures to achieve their conservation and management objectives. These closures are monitored and enforced by NMFS and the U.S. Coast Guard.

Under provisions of an earlier Steller sea lion management actions, vessel monitoring systems (VMS) are required for trawl catcher/processors participating in the Aleutian Islands Atka mackerel fishery. VMS provides real-time information on vessel location and can be useful for enforcing area closures and other elements of the fisheries management program.

As described in Section 4.11.3 of the SEIS, many of the measures to protect Steller sea lions that are incorporated into Alternatives 2 through 5 depend heavily on the strict regulation of the timing and location of fishing activities targeting pollock, Pacific cod, and Atka mackerel. Traditional methods of monitoring compliance with fishing regulations do not fully meet NMFS' need to monitor fishing activities, especially as envisioned under the SSL Protection Measure actions. An electronic "vessel monitoring systems", or VMS, is generally acknowledged to be an essential component of monitoring and management for these measures.

As a result, Alternatives 2 through 5 would require extension of VMS coverage beyond that currently imposed on catcher processors fishing for Atka mackerel in the AI. Under these alternatives, all vessels with a federal groundfish permit, that fish for pollock, Atka mackerel, and Pacific cod in the GOA and BSAI would be required to carry VMS. This extension of the VMS program would impose additional fishery management costs on NMFS (Sustainable Fisheries in-season managers and Enforcement), as well as on the fishing industry, itself.

VMS data will have to be received and interpreted by the Alaska Enforcement Division (AED). This will require staff in Enforcement's Regional Office consisting of a VMS Program Manager, a Computer Specialist, and an Enforcement Technician. In addition, a Special Agent will need to be assigned to VMS oversight in the Regional Office to develop protocols for response, as well as procedures for investigation and case package requirements. This Agent will be the first response to potential violations and decide the course of action to take, depending on the situation. Because follow-up investigations will occur from VMS data, AED will also require two additional Special Agents; one in Dutch Harbor and one in Kodiak.

The following is the estimated costs for the four positions required for VMS implementation:

VMS Program Manager	GS-0343-12	$ 85,000
Computer Specialist	GS–0334-11	$ 77,000
Enforcement Technician	GS-1802-09	$ 60,000
Special Agents (3)	GS-1811-11	$330,000
	TOTAL	$552,000

The types of measures contained in this SEIS increase the complexity of in-season fishery management. Increasing numbers of quotas directly impact staff that track fisheries and write and process regulatory actions to close fisheries. Increasing the number of quotas also results in smaller quotas which are more difficult to manage.

A minimum of three additional staff are needed, one to have responsibility for operations and information extraction for the management VMS system and two to manage fisheries, track quotas and write closure regulatory actions, for an estimated annual cost of $300,000.

Additional private sector VMS costs

As noted, the extension of the VMS program would also impose costs on the fishing industry. The average costs of investment, annual maintenance costs, and annual transmission costs are detailed in the SEIS in Section 4.11.3.6 “Cost of VMS.” The numbers of vessels that would be subject to the VMS restrictions can be determined from Tables 4.11-2 and 4.11-3 in Section 4.11.3.5. These data are used here to estimate the attributable total cost of the VMS program on industry.

As noted in Section 4.11.3.3 of the SEIS, VMS is critical to effective implementation of area restrictions contained in Alternatives 2 through 5. The cost analysis here has been conducted on the assumption that VMS would be required for all vessels active in the federal pollock, Pacific cod, and Atka mackerel fisheries.

VMS is already required in the Atka mackerel fisheries, therefore there is no additional cost imposed upon operations participating in that fishery. In addition, 98 pollock catcher vessels have already installed VMS. Moreover, the Council’s preferred alternative (Alternative 4) does not contemplate critical habitat restrictions for jig vessels. VMS may therefore not be required for this fleet segment. The analysis has been performed with and without inclusion of the jig vessels in the VMS program.

Including the jig vessels, but excluding vessels already using VMS, the total initial investment in VMS equipment, installation and set-up, etc., would be about $1.0 million. Aggregate annual costs, across all effected fleets, for maintenance and transmission are expected to be about $240,000.

A multi-year program is contemplated, however there is a great deal of uncertainty about the length of such a program. To provide some sense of the total cost which may be incurred by the private sector, over the entire duration of a VMS program, it is assumed the program will extend for five years.[46] The discounted present value of such a VMS program, accruing to the private sector, was estimated to be on the order of $2.3 million.

Without inclusion of the jig vessels, the initial investment is approximately $1.0 million, annual costs are $200,000, and the discounted present value is on the order of $1.9 million.

As noted in the SEIS (Section 4.11.3.6) the NOAA Office for Law Enforcement (OLE) expects it would be in their best interest to fund all costs associated with VMS. This includes purchase, installation and operation of a VMS. However, absent timely federal funding support, the cost of VMS would be the responsibility of the vessel operator. The question of the funding source raises two issues: (a) the impact on the cost of implementing the program, and (b) the distribution of the costs among different sectors of the economy.

Whether the ‘private’ sector or the ‘public’ sector pays for the VMS, there would be a cost imposed on society. There is reason to expect that this cost would be larger if the public sector paid. The reason is the “excess burden” of the taxes used to raise the public funds; “excess burden” is the cost of social distortions

[46] The discounted present values have been calculated using a real discount rate of 5.11%. This rate was calculated using an estimate of the nominal rate appropriate to fishing and an estimate of the projected inflation rate. As a result of an empirical analysis of Alaska limited entry permit markets, Karpoff estimated a risk premium for fisheries loans of 5.05% over the rate on U.S. government three month Treasury bills (an almost riskless rate). (Karpoff, page 1165). In late August 2001, the three month rate on Treasury bills was 3.426%. The combination of the riskless interest rate and the risk premium gives a nominal interest rate of 8.53%. CPI data suggests that the inflation rate from June 2000 to June 2001 was 3.2%. This rate was used as an estimate of the inflation rate over the next five years. The nominal rate was adjusted appropriately to calculate the real rate of 5.11%.

created by taxation. OMB cost-benefit guidelines state that a sensitivity analysis should be performed on public investment to reflect a 25% marginal excess burden for federal tax revenues (OMB, Section 11.a). This reflects empirical estimates of the excess burden available in the early 1990s. This 25% excess burden adjustment suggests that the total discounted present value of the costs might be $2.9 million (or $2.4 million if jig is excluded), if the federal government paid for the VMS.

Federal payment of the VMS costs would change the distribution of the program costs. With private payment, the costs would fall on the vessel operators in the first instance. To some extent these costs may be reflected in subsequent crew shares. They are unlikely to be passed on to consumers in most instances.[47] If the Federal government assumed payment, the costs would be shared by all U.S. taxpayers. One possible argument for Federal payment would be that the benefits of saving the Steller sea lions accrue to all U.S. citizens. Private payment of VMS costs imposes the VMS cost of saving the sea lions primarily on the fishing industry. If this argument led to the conclusion that it would be fairer to have everyone share the costs, the tradeoff under consideration would be the increased fairness at a cost to society of about $500,000 (the value of the excess burden). An alternative argument could be made, however, that these commercial operations are exploiting a 'public' resource (namely, the pollock, Pacific cod, and Atka mackerel stocks of the BSAI and GOA), for which they pay no 'rents' to the resource owners, under current management arrangements. Thus, requiring vessel operators to provide an effective means to monitor their exploitation of this 'public' resource, may be regarded as a small cost for this 'privilege'. Both arguments have merit. NMFS takes neither side in this debate, but simply includes both perspectives here for 'completeness'.

Section 4.11.3.7 of the SEIS notes that electronic logbooks have been suggested as an alternative to a VMS system. Because electronic logbook systems are not as tamper resistant as a VMS, and because they would not provide data in as timely a manner as a VMS, NMFS does not expect that electronic logbooks can substitute for VMS for monitoring vessel activity in restricted areas. Since electronic logbooks are not currently a part of the alternatives, their costs have not been evaluated here.

Additional private sector observer costs

The observer program is conducted by NMFS, AFSC. Under provisions of this management program, the industry contracts directly with authorized "Observer Provider" companies. These firms supply observers to fishing vessel operators (as well as, to shoreside plants) under contract. The fishing vessel operator pays for the observer services, as required, based upon the coverage level specified in regulation.

Two of the SSL Protection Measure alternatives under consideration contain provisions requiring supplemental observer coverage, in one or more of the pollock, Pacific cod, and Atka mackerel fisheries. The first, Alternative 2, for example, would require observer coverage on all vessels under 60 feet LOA, utilizing fixed gear (hook and line, pots, or jigs) in the Pacific cod target fisheries, while such vessels are fishing within SSL critical habitat, in the BSAI or GOA. At present, all such vessels are 'exempted' from observer coverage requirements. This proposal has been interpreted to require a 30% coverage level. This decision was taken, because current regulations mandate 30% observer coverage for all vessels between 60' and 124' (LOA). Thus, imposition of a higher level of coverage than this, for the smallest members of the fleet, would impose a disproportionate (and potentially significant) burden, that could not be justified on the basis of the additional observer information obtained.

[47]This conjecture is predicated on a relatively inelastic supply and a relatively elastic demand.

NMFS commonly uses an estimated daily contract rate of $300/ observer. This rate probably underestimates the true cost of acquiring observer coverage, incurred by the fishing vessel operator, because the contracts between the observer provider company and vessel operator typically also include payments for the observers' logistical and transportation expenses.

Table 4.11.3 in the SEIS indicates that 75 hook and line (HAL), 14 pot, and 129 jig vessels participated in the Pacific cod target fisheries in the BSAI and/or GOA management areas, in 2000. Information on the extent to which they operated inside or outside of critical habitat is not available. For this analysis, it is assumed these small boats operated exclusively *within* critical habitat. While this assumption potentially imparts an upward bias to the cost estimates, it may nonetheless be justified on several grounds. First, a boat under 60' (LOA), fishing 'fixed gear', has an exceedingly limited operating range, especially given the remoteness of BSAI and GOA fishing areas outside of CH, and the extreme sea and weather conditions during much of the P.cod fishing season.

Second, the majority of these vessels rely upon inshore processing facilities to receive and process their catch. With exceedingly limited holding capacity, and physical constraints on running-speed and range, most will have prosecuted the fishery as near shore and near port, as feasible. Given the distribution of existing inshore processing facilities, relative to SSL CH, it is probable that the vast majority of effort, from this segment of the Pacific cod fleet, took place in (or very near) CH.

Third, the height of the cod season (i.e., when CPUEs are at their peak) traditionally has focused on times and areas when the fish are in spawning aggregation. This typically occurs in late-winter and 'near shore'. To the extent that historical fishing patterns for these smallest members of the Pacific cod fixed gear fleet are relied upon to predict future behavior, it is likely the vast majority of their effort has (and will) take place with CH. Thus, as suggested, the simplifying assumption cited above, may be reasonable.

For vessels <60' LOA, targeting Pacific cod, with:

- *HAL:* Examination of fish tickets suggests that these hook-and-line vessels typically took 6.5 trips of 2.7 days each. Since all of these were assumed to be within critical habitat, they are all assumed to require 30% coverage, or an observer's services for 5.3 days per vessel per year. Total annual cost for all 75 HAL boats is estimated to be about $118,000. The discounted present value of these costs, over a five year period, is estimated to be about $537,000[48].
- *Pot:* Examination of fish tickets suggests that these pot vessels typically took 10 trips of 2.1 days each. Since all of these were assumed to be within critical habitat, they are all assumed to require 30% coverage, or an observer's services for 6.3 days per vessel per year. Total annual cost for all 15 pot vessels is estimated to be about $26,000. The discounted present value of these costs, over a five year period, is estimated to be about $120,000.
- *Jig:* Examination of fish tickets suggests that these jig vessels typically took 4.4 trips of 1.4 days each. Since all of these were assumed to be within critical habitat, they are all assumed to require

[48] The discounted present values have been calculated using a real discount rate of 5.11%. This rate was calculated using an estimate of the risk-adjusted nominal rate appropriate to fishing and an estimate of the projected inflation rate. As a result of an empirical analysis of Alaska limited entry permit markets, Karpoff estimated a risk premium for fisheries loans of 5.05% over the rate on U.S. government three month Treasury bills (an almost riskless rate). [Karpoff, page 1165]. In late August 2001, the three month rate on Treasury bills was 3.426%. The combination of the riskless interest rate and the risk premium gives a nominal interest rate of 8.53%. CPI data suggests that the inflation rate from June 2000 to June 2001 was 3.2%. This rate was used as an estimate of the inflation rate over the next five years. The nominal rate was adjusted appropriately to calculate the real rate of 5.11%.

30% coverage, or an observer's services for 1.8 days per vessel per year. Total annual cost for all 129 jig vessels is estimated to be $72,000. The discounted present value of these costs, over a five year period, is estimated to be about $324,000.

Total annual costs across all three fixed gear groups are about $200 thousand; the total discounted present value of these costs over a five year period is about $1.0 million.[49] Note, again, these estimates may systematically understate the actual total outlay for observer services, attributable to this provision of Alternative 2, because of the other contractual cost elements, earlier identified.

The second alternative which explicitly changes observer coverage requirements is Alternative 4. If adopted, this alternative would require two NMFS certified observers on catcher-processors, fishing for Atka mackerel, during the entire period when CH areas are open to Atka mackerel target fishing in Areas 542 and 543. After CH is closed, the "two observer" requirement would be lifted, and coverage would revert to current levels, for the balance of the Atka target fishery opening, in these areas.

Table 4.11.2 in the SEIS indicates that 12 trawl catcher-processors participated in the 2000 Aleutian Islands Atka mackerel fisheries. NMFS in-season managers estimate that the Atka mackerel season will be about 12 weeks in 2002. This analysis assumes that each of the catcher-processors will fish for that full period. Clearly, not all of this fishing effort will take place in CH, although the actual division of fishing days 'inside' and 'outside' CH cannot readily be estimated, given available information. Galen Tromble, Alaska Region Sustainable Fisheries staff, when consulted on this matter, had the following response:

> *"Based on the pace of the (Atka) fishery this year, and the increased CH quota next year, 12 weeks is a generous (probably too generous) estimate of the amount of time that a vessel might fish in CH. It's almost certainly on the high end.*
>
> *Another way to estimate the time is to take the anticipated inside CH quota for next year in 542 and 543 -- around 40,000 mt - and divide that by the fleet daily catch rate, which is about 1,000 mt. That gives just under 6 weeks.*
>
> *I've talked some more with the in-season staff, and I think the lower estimate is more likely, given the way the platoon system will operate, with fixed season openings based on maximum catch capacity. However, another factor on the observer coverage is that vessels aren't going to be able to obtain and get rid of observers on a day by day basis. It is likely that a vessel with two observers will have the extra observer during additional days in between CH openings, or while in transit between 542 and 543. That could easily add a week or two.*
>
> *I have high confidence that the actual amount of time that an Atka mackerel vessel next year would have two observers is bounded by the 6 week and 12 week estimates, and think that the lower end of that range is more likely than the upper."* [50]

[49] The apparent discrepancies between annual cost and discounted present value, over five years, is due to rounding errors.
[50] Per. comm., Galen Tromble, NMFS Alaska Region, September 27, 2001.

Adopting this suggested procedure will produce a range of potential observer services costs for this sector. It may be the case, that even the lower end of the range may overstate the true observer costs, because some of the operations may choose not fish the full available period. Some, for example, may not fish in Western Aleutians Area 543. Others may opt to fish the "A" season, but not the "B" season, or visa versa. With these limiting assumptions in mind, a vessel fishing for "12 weeks" could be active for as many as 84 days. At \$300/observer day, this operator would incur an "*additional*" observer expense of approximately \$25,000. The emphasis on "additional" is important here, because each of these vessels already is expending at least an equivalent amount for the current observe, they are required to carry. On this basis, the full Atka mackerel fleet would incur an "additional" annual expense of about \$300,000, for the second mandatory observe, under this proposal. The present value of this expense, over five years, would be about \$1.4 million.

If we assume, alternatively, that the period during which the second observer will be required to be carried aboard these operations is six weeks, the "additional" observer cost, per vessel, would be approximately \$12,600. On the basis of this lower-bound estimate, the full Atka mackerel fleet would incur an "additional" annual expense of about \$151,000, for the second mandatory observe, under this provision of Alternative 4. The present value of this expense, over five years, would be approximately \$700,000.

As noted, the cost estimates above do not include the logistics and transportation expenses incurred by the observers. These expenses would be billed, on top of the assumed \$300/day observer costs, to the fishing vessel operators. But, in addition, these fishing operations incur economic and operational impacts that are not directly reflected in the money they must spend on observer coverage. For example, fishing vessel operators may have to alter their travel plans and schedules to pick up or drop off observers; the observers take up limited (and valuable) space on vessels which (especially in the class of vessels under 60 feet) may be at a premium. That is, provisions must be made to accommodate the necessary work of the observe on deck (e.g., observing gear setting and retrieval, recording and sampling of catch and bycatch). The observer also occupies "living space" aboard, which otherwise could have housed additional crew members. These operational impacts may be reflected in both increased operating expenses and reduced harvests and revenues. It is not possible, with available information, to quantify these effects, but they may represent a substantial additional cost of operation for this class of vessels.

The discussion above was predicated on a set of costs that reflect experience in the current 100% and 30% observed fleets. There are a number of reasons to expect that the costs of supplying certified observers to the small boat fleet (which, as noted, has heretofore been exempted from observer coverage requirements) will be higher, on average, than the costs of supplying observers to the larger vessel fleet.

These may include (among others):

- Observers are likely to find the working and living conditions more difficult on the smaller boats; they will have fewer amenities, more restricted living and working space, and may not be as safe as when assigned to larger vessels. Wages may have to be higher to continue to attract sufficient numbers of qualified observers to meet the new demand associated with extending coverage requirements to this segment of the industry. These higher wage costs (should they emerge) are not reflected in the present estimates.
- Moreover, the logistical expenses are likely to be higher to supply observers for these small boats. Many operate out of small, remote ports, with limited (if any) commercial transportation support, making it more expensive to get the observers to their assigned vessels.
- Smaller vessels tend to take shorter (but more frequent) trips than their larger counterparts, in these fisheries. Because only 30% observer coverage will be required under this proposed alternative, this means that observers will spend more time transferring between operations (and perhaps locations),

as each deployment is made for a shorter "trip" duration. The logistical and transportation costs are likely to be much higher, per unit observer coverage, than under present conditions.

- In addition to these higher costs, it may be harder for observer provider companies to supply observers to small operations in a timely manner; thus, fishermen may lose fishing time and profits due to an inability to obtain required observer coverage.
- These problems may be exacerbated by the increased demand for observers, in light of existing shortages of "qualified observers" to meet even current demand.

The platoon management system for Atka mackeral under Alternative 4 presents additional complexity, including a registration system, intense in-season monitoring of quotas, additional closure notices, and an expected heavy load of data analysis and communication with the industry. Implementation of this measure would add a fourth position to the management requirements, for an estimated total cost of $400,000.

Summary of management and enforcement costs

Additional NMFS enforcement and in-season management expenses were expected to be about $952 thousand per year for Alternative 4, about $852 thousand per year for alternatives 2, 3, and 5, and nothing for Alternative 1. Additional private sector VMS costs were estimated to have a five year present value of about $1.9 million for alternatives 2, 3, 4 and 5, and nothing for alternative 1. Additional private sector observer costs were estimated to have a cost of about $200 thousand a year for Alternative 2 (which required extension of 30% observer coverage to vessels under 60 feet), $300 thousand for Alternative 4 (which required a second observer on vessels fishing Atka mackerel), and nothing for the other alternatives. The $200 thousand estimate for the extension of the 30% coverage to the small boats was assumed to be a low estimate of true costs for reasons explained in the document. These cost estimates suggest the following cost ranking of these alternatives:

- Alt 1: no additional management and enforcement costs (baseline)
- Alt 3, 5: additional costs for NMFS enforcement and VMS
- Alt 2, 4: Alt. 2 includes the same additional NMFS and VMS costs as alternatives 3 and 5, and adds costs for 30% observer coverage on vessels under 60 feet targeting Pacific cod. Alt 4 includes the same additional NMFS and VMS costs as alternatives 2, 3, and 5, and adds costs for additional observers on Atka mackerel vessels. Since the observer costs for Alternative 2 may be underestimated, it is not certain that it is a lower cost option than Alternative 4.

1.3.6 Summary of Costs and Benefits

Until an alternative is selected and implemented, and the industry has an opportunity to adjust fishing patterns and behavior in accordance with the new regulatory parameters, it is unlikely that even the industry members, themselves, can fully anticipate the size and distribution of effects of the SSL Protection Measure package. With that caveat, as noted, although much of the foregoing analysis has been qualitative, some quantitative estimates are provided. It was, for example, possible to make a monetary estimate of the gross revenues placed "at risk," from the reduction in production, under alternative provisions of the suite of SSL Protection Measure alternatives before the Council.

The 'relative' rankings of the individual alternatives, to the degree that they could be meaningfully distinguished, are present below, for the principal cost and benefit categories, treated in greater detail above.

Table C-22 Summary of Benefits and Costs by Alternative

BENEFIT OR COST CATEGORY	**ALTERNATIVE 1** (No action)	**ALTERNATIVE 2** (Low and slow)	**ALTERNATIVE 3** (Restricted and close areas)	**ALTERNATIVE 4** (Area and fishery specific)	**ALTERNATIVE 5** (CH catch limits)
SSL Existence value	Fails to remove jeopardy; **not a viable alternative**	Each is expected (by its proponents) to meet “minimum” jeopardy thresholds and is, therefore, “superior” to the status quo. It is not possible, with available information, to distinguish among these four alternatives on the basis of this criterion.			
SSL Use values	Fails to remove jeopardy; **not a viable alternative**	Expected to result in most rapid rate of improvement in SSL stock among alternatives. Ranks 1st among alternatives on this criterion.	Expected rate of improvement in SSL stock below that of alternatives 2 & 4. Likely ranks 3rd, among alternatives, on this criterion.	Expected rate of improvement in SSL stock below only that of alternative 2. Likely ranks 2nd, among alternatives, on this criterion.	Expected to result in slowest rate of improvement in SSL stock among alternatives. Likely lowest ranking among the alternatives to the status quo, on this criterion.
Gross revenues	Relatively little impact on ‘historical’ maximum potential gross revenues; least gross revenues placed at risk; constitutes analytical ‘baseline’; likely ranks 1st among alternatives on this criterion.	Largest reduction in maximum potential gross revenues; second largest gross revenues placed “at risk”; likely is the most burdensome, ranking 5th on this criterion.	Relatively little impact on maximum potential gross revenues, as compared to the status quo; largest gross revenues placed “at risk”; likely ranks 4th on this criterion.	Largest projected maximum potential gross revenues; intermediate level of gross revenues placed “at risk”; likely ranks 2nd on this criterion.	Relatively little impact on maximum potential gross revenues, as compared to the status quo; intermediate level of gross revenues placed “at risk” (greater than Alt. 4); likely ranks 3rd on this criterion.

Table C-22 (Cont.) Summary of Benefits and Costs by Alternative

BENEFIT OR COST CATEGORY	ALTERNATIVE 1 (No action)	ALTERNATIVE 2 (Low and slow)	ALTERNATIVE 3 (Restricted and close areas)	ALTERNATIVE 4 (Area and fishery specific)	ALTERNATIVE 5 (CH catch limits)
Operating costs	Baseline condition (i.e., no change in cost and earnings)	Likely yields highest adverse operating cost and earnings impacts among the alternatives, by imposing the most restrictive set of management measures and structural changes (e.g., sharply reduced TACs, four equal season apportionments, total CH trawl ban, area exclusive registration, AI pollock closure, maximum daily catch limits, VMS, etc.). Ranks lowest among alternatives, on this criterion.	Based upon the 2000 BiOp RPA, imposes significant structural limits, (e.g., establishes large areas of CH closed to pollock, cod, and mackerel fishing, and restrict limits on remaining CH catch.) Designed to protect SSL and provide monitoring to assess effects, with minimal consideration of fishery impacts. May have nearly as great an adverse effect on costs and earnings as alternative 2, with greater potential burden on smallest operations. Likely ranks 3rd among alternatives to the status quo, on this criterion.	Designed by the RPA committee to be "less restrictive" in terms of regulatory burdens imposed and operational flexibility provided (as compared to provisions of alternative 2, 3, or 4), while meeting SSL objectives. Likely imposes lowest operating costs and earnings impacts, overall. Seeks to reduce economic and operational impacts on small operations, especially if options 1, 2, and/or 3 are included. Ranks 1st among alternatives to the status quo, on this criterion.	Similar in structure to alternative 3, imposes less restrictive universal closures on rookeries and haulouts. More restrictive in AI pollock. With fewer elemental components, this alternative appears less complex and thus potentially less burdensome. Likely falls between alternatives 3 and 4, in terms of relative impact, i.e., likely ranking 2nd, on this criterion.
Safety	Baseline condition (i.e., no change safety)	Results in largest operational changes (e.g., transit greater distances between port and open fishing grounds, fish farther offshore, aggravate race-for-fish). High potential to increase the risk of accidents and injury. While difficult to judge, likely ranks a distant 2nd (or perhaps 3rd) to alternative 4, on this criterion, among alternatives to the status quo.	Closes large areas of SSL CH to pollock, P.cod, and Atka mackerel fishing, while strictly limiting fishing in remaining CH, displacing effort into areas more distant from shore and more remote from ports and traditional operating areas. High potential to increase the risk of accidents and injury. Likely ranks lowest among alternatives to the status quo, on this criterion.	Appears to reduce some of the more onerous aspects of Alternatives 2, 3, and 5, with respect to proximity of open fishing areas and operating ports. Reduces some requirements which force effort farther offshore (especially for the smaller segments of fleets) and should, therefore, impose a relatively lower risk of accident and injury, to the extent that occurrence of accidents and injuries are highly correlated with fishing distance offshore, vessel size, etc. Likely ranks 1st among alternatives to the status quo, on this criterion.	Similar in structure to alternative 3, relies heavily on time and area restrictions, TAC apportionments, and CH closures. Likely to result in equivalent outcomes to alternative 3 on this criterion (i.e., relatively high potential to increase the risk of accidents and injury). Likely ranks 3rd (or perhaps 4th) among alternatives to the status quo, on this criterion.

Table C-22 (Cont.) Summary of Benefits and Costs by Alternative

BENEFIT OR COST CATEGORY	**ALTERNATIVE 1** (No action)	**ALTERNATIVE 2** (Low and slow)	**ALTERNATIVE 3** (Restricted and close areas)	**ALTERNATIVE 4** (Area and fishery specific)	**ALTERNATIVE 5** (CH catch limits)
Consumers impacts	Baseline condition (i.e., no change in consumer welfare)	Likely results in the (relatively) largest adverse impact on aggregate seafood production, in the form of supply contraction, potential loss of quality, and/or higher prices, all of which will adversely impact consumers. Ranks lowest among alternatives to the status quo, on this criterion.	Likely results in (relatively) very large adverse impacts on aggregate seafood production, in the form of supply contraction, potential loss of quality, and/or higher prices, all of which will adversely impact consumers. Likely ranks 3rd among alternatives to the status quo, on this criterion.	Likely results in the (relatively) lowest adverse impact on aggregate seafood production, in the form of supply contraction, potential quality, and/or higher prices, all of which will adversely impact consumers. Likely ranks 1st among alternatives to the status quo, on this criterion.	Likely results in moderate impacts on consumer supply, quality, and price. Some of the required regulatory adjustments have been successfully incorporated (e.g., AFA pollock). Others largely impact non-domestic consumers (e.g., Atka markets) and would not be counted here. Uncertainty about the actual 'form' of cod restrictions make judgement here difficult. Likely ranks 2nd among alternatives to the status quo, on this criterion.
Management and Enforcement costs	Baseline condition (i.e., no change in management and enforcement costs)	Alts. 2 and 4 are higher cost than 3 and 5; difference between 2 and 4 unclear.	There is effectively no discernable difference between Alt. 3, and 5 on the basis of this criterion.	Alts. 2 and 4 are higher cost than 3 and 5; difference between 2 and 4 unclear.	There is effectively no discernable difference between Alt. 3, and 5 on the basis of this criterion.

1.4 Distributional Impacts

A benefit-cost analysis is principally focused on questions of aggregate "net benefits to the nation". However, a program which has positive net benefits for the nation, as a whole, may nonetheless leave some persons or groups worse off than before. For equity reasons, it is common to accompany a benefit-cost analysis with a distributive analysis, that looks at the impacts of a proposal on specific impacted groups.

The discussion of distributional impacts in this section is divided into three parts. Section 1.4.1 examines the relative dependence of different segments of the fleet on the target fisheries impacted by the proposed alternatives (i.e., pollock, Atka mackerel, and Pacific cod) and on fisheries (such as salmon and halibut) that are not directly regulated by the alternatives, but which may, nonetheless, experience 'spill-over' effects from them. Section 1.4.2 provides a highly disaggregate presentation of the outputs from the gross revenues simulation model, used earlier to project the first wholesale earnings "at risk", for the different alternatives. Section 1.4.3 provides a discussion of the impacts of these SSL Protection Measure alternatives on the adjacent 'fishery dependent' communities and regions of western Alaska, including detailed descriptions of the communities most likely to be affected.

1.4.1 Catcher Vessel Ex-vessel Dependency

When considering new fishery management or regulatory restrictions for the fishing industry operating in the Bering Sea and Gulf of Alaska, it is important to understand how contemplated changes may affect the financial viability of fishing businesses operating in these areas. This section provides analysis of the relative level of dependence of fishing operations, which will be directly regulated under proposed SSL Protection Measures, on several fisheries. The specific focus is on the 'ex-vessel' level of the industry, that is: 1) catcher vessels targeting pollock, 2) catcher vessels targeting Pacific cod, and 3) catcher vessels targeting Atka mackerel.

The fisheries were divided into three general areas: the Bering Sea (including the Aleutian Islands), the Central Gulf, and the Western Gulf. The Bering Sea incorporates statistical areas 500 through 538. The Central Gulf is comprised of statistical areas 620 and 630. The Western Gulf is comprised of statistical area 610.

The analyses were based upon the State of Alaska fish ticket files, as well as license files from the Commercial Fisheries Entry Commission, for various years. The analyses were limited to catcher vessel records. The steps in the process are outlined below.

- data were selected for the years 1995 through 2000.
- vessels were separated into the following length categories:
    - vessels 32 feet or less
    - vessels between 33 and 59 feet
    - vessels between 60 and 124 feet, and
    - vessels 125 feet and over
- gear categories include: longline, pot, trawl, jig and other
- the ex-vessel value, which is a fishing operator's gross revenue, was calculated using the number of round pounds landed with each fish ticket delivery, matched with the estimated ex-vessel value for that species, area and year from Commercial Fisheries Entry Commission data files.
- a targeting analysis was completed to define targeted and non-targeted catch. The targeting

routine utilized by the NPFMC looks at each fish ticket and allocates the targeted species to the species with the highest proportion of harvest for the statistical area being reported. The exception to this method is halibut, because halibut is determined as the target fishery at lower levels of proportional harvest.

- the number of unique fishing vessels participating in each fishery was determined, along with the total revenue from that fishery.
- catches and earnings are confidential data, and cannot be released where there are four or fewer participants in a grouping. To protect the confidential status of the income data and still achieve the goal of showing relative dependence upon the respective target species, the dependence tables (Tables C-23 through C-54) are presented in relative percentages of total gross revenue for each vessel group. The number of unique vessels that are included in the group and the total level of gross fishing revenue are discussed in the respective sections below.

As noted above, the focus of this section is on vessels targeting pollock, Pacific cod and Atka mackerel. The fishing income, by year, area, gear type, and vessel length was separated for each of these target species. The levels of income groupings were as follows:

- targeted catches and ex-vessel values for (pollock, Pacific cod, and Atka mackerel) in the respective area (Bering Sea, Central Gulf, Western Gulf).
- non-targeted catches and ex-vessel values for (pollock, Pacific cod, and Atka mackerel) in the respective area (Bering Sea, Central Gulf, Western Gulf).
- catches and values for all other groundfish within the same specific area
- catches and values for all groundfish harvested in all Alaskan waters, excepting only the specific area (Bering Sea, Central Gulf, Western Gulf) being analyzed.
- catches and values for other species. The other grouping is comprised of salmon, herring, crab and halibut fisheries. Dependence upon the other species incomes tends to be highest for the small and mid-length vessels.

The basic question this section addresses is, "*For catcher vessels in the Bering Sea, Central Gulf and Western Gulf (targeting pollock, Pacific cod or Atka mackerel), what is the relative dependence on the target species and other fisheries, as a proportion of total fishing gross income?*" It is important to recognize that the vessel groups showing catches and values by target species are not mutually exclusive. For example, when looking at vessel catches and values for those vessels targeting on pollock, the 'other groundfish' harvested in the area may include Pacific cod or Atka mackerel. Similarly, the catches and values for Pacific cod include pollock and Atka mackerel in the 'other groundfish' category. Vessels targeting both pollock and Pacific cod will appear in the vessel group categories for both species.

Also note that the State of Alaska fish ticket file for 2000 is not fully completed. It does not yet include catches and values for halibut. For example, Table C-23 shows small vessels operating in the Bering Sea in 2000 had a 0.0% contribution from other species, primarily halibut, for this fleet group. When the year 2000 fish ticket file is fully complete, the analysis would likely show that the relative contribution to income from the other species category is in line with prior years.

1.4.1.1 Pollock

Tables C-23 through C-38 portray the relative dependence of the respective fishing fleets on targeted and non-targeted pollock fishing revenues. The relative dependence is shown by the percentage contribution to total gross revenue from the fishery categories outlined above.

Table C-23 shows the relative dependence on pollock by vessels 32 feet and less utilizing longline gear. As might be expected, pollock earnings contribute almost nothing to this vessel group. Most earnings are from the traditional species included in the other category, predominantly salmon and halibut. There are just a few vessels in this category in the Bering Sea and Western Gulf areas. In the Central Gulf, the numbers of vessels range between 32 and 60, with gross fishing revenues ranging from $1.5 million to $6.5 million.

Table C-24 shows the relative dependence on pollock by vessels 32 feet and less utilizing pot gear. There are just a few of these vessels, focusing primarily on salmon in the Central Gulf.

Table C-25 shows the relative dependence on pollock by vessels 32 feet and less utilizing jig gear. There are modest numbers of vessels in this group. In the Bering Sea, the numbers of vessels in this group range from five to twenty-two. In the Central Gulf, the number of these vessels is higher, and range from 12 to 42 vessels. In the Western Gulf, the number of vessels in the group ranges from two to fourteen. Fishing income for this group comes primarily from salmon, with halibut contributing a smaller proportion to total fishing revenues. In the Central Gulf, total revenues for the group range from $500 thousand to $1.3 million.

Table C-26 shows the relative dependence on pollock of vessels 32 feet and less utilizing other gear. Again, pollock plays almost no role in overall fishing revenues for this category of vessels. There are very few vessels in this grouping, fewer than 10 vessels in the Bering Sea and Western Gulf. In the Central Gulf, there the number of vessels ranges between six and fifteen. Earnings for this group are primarily from other groundfish within the same area, salmon and halibut.

Table C-27 shows the relative dependence on pollock of vessels between 33 and 59 feet utilizing longline gear. Pollock contributes almost nothing to the overall revenues for this group. Most of the pollock earnings are from non-targeted catches. Earnings for this group come predominantly from Alaska groundfish outside the area and from other species, including salmon and halibut. There is a large fleet in this group operating in the Central Gulf, ranging between 315 and 397 vessels. In the Bering Sea and Western Gulf, the number of vessels varies from 13 to 39, and from 35 to 45, respectively. Gross earnings for this group in the Central Gulf ranges between $59 million and $94 million, over the period of analysis.

Table C-28 shows the relative dependence on pollock of vessels between 33 and 59 feet utilizing pot gear. Pollock contributes very little to the total earnings of these vessel groups. Most earnings are from a relatively even distribution of fisheries, including other groundfish, salmon and halibut, with a proportionally smaller contribution from crab and herring. In the Bering Sea, the number of vessels in this category varies between two to sixteen In the Central Gulf, the numbers vary between 49 and 85 and in the Western Gulf, the number of vessels varies between 34 and 69. Gross earnings from fishing in the Central Gulf range from $13 million to $32 million.

Table C-29 shows the relative dependence on pollock of vessels between 33 and 59 feet utilizing trawl gear. This group includes the "limit salmon seiners" that have added trawl gear. Pollock is a modestly important species to this vessel group, generally ranging between 3% and 9% of total fishing revenue. Other important fisheries include other groundfish, as well as the traditional other species of salmon and halibut. The numbers

of participants in this group vary considerably in the Bering Sea and Central Gulf, from two to fifteen vessels and from 10 to 53 vessels, respectively, for the period from 1995 through 2000. In the Western Gulf, participation remains more constant, varying only between 39 to 41 vessels. In the Central Gulf, total fishing revenues range between $3.6 million and $22 million.
Table C-30 shows the relative dependence on pollock of vessels between 33 and 59 feet utilizing jig gear. Pollock is not an important contributor to fishing revenues for this group. Most earnings come from other species, predominantly salmon and halibut. Other groundfish, both within the area and statewide, contribute important shares of revenue to this group, particularly in the Bering Sea. In the Bering Sea, the numbers of vessels range from four to eighteen. In the Central Gulf, the numbers of vessels in this category range from 42 to 126. In the Western Gulf, the number of these vessels ranged from 13 to 23. Total revenues in the Central Gulf ranged from $2.4 million to $11 million, over this period.

Table C-31 shows the relative dependence on pollock of vessels between 33 and 59 feet utilizing other gear types. There are no vessels in this group for the Bering Sea. In the Central Gulf and Western Gulf, the number of vessels in this group is relatively small, fewer than ten in most years. Most fishing revenues are from participation in the salmon fishery. Pollock catches and earnings are near zero for this group.

Table C-32 shows the relative dependence on pollock of vessels between 60 and 124 feet utilizing longline gear. Pollock contributes a very small proportion of total fishing revenues for this group, primarily from non-targeted bycatch. There has been a downward trend in the number of vessels participating in this group over the period from 1995 to 2000. In the Bering Sea, the number of vessels has varied between 22 and 40. In the Central Gulf, the number of vessels ranges between 92 and 134. In the Western Gulf, this group has included 35 to 53 vessels, over the interval of analysis. Total earnings for the Central Gulf fishery have been between $35 million and $82 million, for the 1995 to 2000 period.

Table C-33 shows the relative dependence on pollock of vessels between 60 and 124 feet utilizing pot gear. There are very limited earnings from pollock within this group. The focus is predominantly on other groundfish (primarily Pacific cod) and crab. Over the 1995-2000 period, the numbers of vessels in this group have varied between 50 and 87 in the Bering Sea, 38 and 68 in the Central Gulf, and between 18 and 35 in the Western Gulf. In the Bering Sea, total ex-vessel revenues for the group have ranged from $39 million to $79 million, for the 1995 through 2000 period.

Table C-34 shows the relative dependence on pollock of vessels between 60 and 124 feet utilizing trawl gear. Pollock revenues contribute a large share of total revenues for this group, particularly for those fishing in the Bering Sea, where it accounts for 26% to 33%. The largest number of current participants in this group is in the Bering Sea, where the number of vessels has varied between 65 and 83. The number of vessels in this group within the Central Gulf has recently declined slightly, varying to the lower end of the 54 to 83 vessel range. Similarly, the numbers of vessels in the Western Gulf have declined to the lower end of the 17 to 55 vessel range. The total revenues for the Bering Sea fleet have varied from $66 million to $135 million.

Table C-35 shows the relative dependence on pollock of vessels between 60 and 124 feet utilizing jig gear. There are very few vessels in this group, with almost no income from pollock. Table C-36 shows the relative dependence on pollock of vessels between 125 feet and greater utilizing longline gear. There are few vessels in this group, with almost no earnings from pollock. Most earnings come from other groundfish or halibut.

Table C-37 shows the relative dependence on pollock of vessels between 125 feet and greater utilizing pot gear. Income for this group comes primarily from other groundfish and crab. The numbers of vessels in this group in the Bering Sea have varied between 15 and 25, with total earnings ranging from $17 million to $28 million. There are fewer than ten each of these vessels, respectively, in the Central and Western Gulf areas.

Table C-38 shows the relative dependence on pollock of vessels between 125 feet and greater utilizing trawl gear. As would be expected, pollock is a very important fishery for this vessel group. In the Bering Sea, 41% to 46% of total revenues come from targeted pollock fishing in the area. "Groundfish" is the predominant source of revenue in all three areas, with pollock landings within the Central and Western Gulf areas contributing a lesser proportion of total earnings. The numbers of vessels in the Bering Sea have ranged from 22 to 36, over the 1995 through 2000 period. In the Central Gulf, the numbers of vessels have ranged between five and eleven, while the number of vessels in the Western Gulf ranged between two and twenty-three. Total revenues for the Bering Sea group have varied between $90 million and $206 million.

Table C-23 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using longline gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	longline	Bering Sea	1995	0.0%	0.0%	1.1%	6.8%	92.1%	100.0%
32 or less	longline	Bering Sea	1996	0.0%	0.0%	26.5%	30.1%	43.4%	100.0%
32 or less	longline	Bering Sea	1997	0.0%	0.0%	2.1%	9.7%	88.1%	100.0%
32 or less	longline	Bering Sea	1998	0.0%	0.0%	6.1%	18.9%	75.0%	100.0%
32 or less	longline	Bering Sea	1999	0.0%	0.0%	0.6%	0.6%	98.9%	100.0%
32 or less	longline	Bering Sea	2000	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	longline	Central Gulf	1995	0.0%	0.0%	3.6%	7.0%	89.4%	100.0%
32 or less	longline	Central Gulf	1996	0.0%	0.0%	11.5%	20.0%	68.5%	100.0%
32 or less	longline	Central Gulf	1997	0.0%	0.0%	10.8%	12.0%	77.1%	100.0%
32 or less	longline	Central Gulf	1998	0.0%	0.0%	10.4%	13.5%	76.1%	100.0%
32 or less	longline	Central Gulf	1999	0.0%	0.0%	5.4%	6.3%	88.4%	100.0%
32 or less	longline	Central Gulf	2000	0.0%	0.0%	26.5%	27.3%	46.2%	100.0%
32 or less	longline	Western Gulf	1995	0.0%	0.0%	0.3%	2.3%	97.4%	100.0%
32 or less	longline	Western Gulf	1996	0.0%	0.0%	4.8%	39.0%	56.2%	100.0%
32 or less	longline	Western Gulf	1997	0.0%	0.0%	0.1%	13.6%	86.3%	100.0%
32 or less	longline	Western Gulf	1998	0.0%	0.0%	0.6%	45.7%	53.7%	100.0%
32 or less	longline	Western Gulf	1999	0.0%	0.0%	10.4%	32.4%	57.2%	100.0%
32 or less	longline	Western Gulf	2000	0.0%	0.0%	15.4%	15.4%	69.2%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-24 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using pot gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	pot	Bering Sea	2000	0.0%	0.0%	11.5%	11.5%	76.9%	100.0%
32 or less	pot	Central Gulf	1995	0.0%	0.0%	4.5%	4.5%	90.9%	100.0%
32 or less	pot	Central Gulf	1996	0.0%	0.0%	1.4%	1.4%	97.1%	100.0%
32 or less	pot	Central Gulf	1997	0.0%	0.0%	1.0%	1.0%	98.0%	100.0%
32 or less	pot	Central Gulf	1999	0.0%	0.0%	7.5%	7.5%	85.0%	100.0%
32 or less	pot	Central Gulf	2000	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	pot	Western Gulf	1995	0.0%	0.0%	5.3%	5.3%	89.4%	100.0%
32 or less	pot	Western Gulf	1997	0.0%	0.0%	0.5%	0.5%	98.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table 6.3.1.3: Relative Dependence on Pollock as a Percentage of Total Gross Revenue by Vessel Length, Gear and Area 1995-2000

Table C-25 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using jig gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	jig	Bering Sea	1995	0.0%	0.0%	14.7%	19.3%	66.0%	100.0%
32 or less	jig	Bering Sea	1996	0.0%	0.0%	19.1%	33.8%	47.1%	100.0%
32 or less	jig	Bering Sea	1997	0.2%	0.0%	12.3%	32.1%	55.4%	100.0%
32 or less	jig	Bering Sea	1998	0.0%	0.0%	21.9%	23.9%	54.2%	100.0%
32 or less	jig	Bering Sea	1999	0.0%	0.0%	34.2%	35.5%	30.3%	100.0%
32 or less	jig	Bering Sea	2000	0.0%	0.0%	6.3%	23.1%	70.6%	100.0%
32 or less	jig	Central Gulf	1995	0.0%	0.0%	7.9%	16.1%	76.0%	100.0%
32 or less	jig	Central Gulf	1996	0.0%	0.0%	6.6%	11.8%	81.7%	100.0%
32 or less	jig	Central Gulf	1997	0.0%	0.0%	20.3%	29.1%	50.7%	100.0%
32 or less	jig	Central Gulf	1998	0.0%	0.0%	22.5%	28.7%	48.8%	100.0%
32 or less	jig	Central Gulf	1999	0.0%	0.0%	17.0%	17.0%	66.0%	100.0%
32 or less	jig	Central Gulf	2000	0.0%	0.0%	32.7%	34.2%	33.1%	100.0%
32 or less	jig	Western Gulf	1995	0.0%	0.0%	13.8%	25.9%	60.4%	100.0%
32 or less	jig	Western Gulf	1996	0.0%	0.0%	13.6%	30.1%	56.3%	100.0%
32 or less	jig	Western Gulf	1997	0.0%	0.0%	10.4%	22.7%	67.0%	100.0%
32 or less	jig	Western Gulf	1998	0.0%	0.0%	14.6%	26.8%	58.5%	100.0%
32 or less	jig	Western Gulf	1999	0.0%	0.0%	9.2%	14.0%	76.8%	100.0%
32 or less	jig	Western Gulf	2000	0.0%	0.0%	20.0%	26.9%	53.1%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-26 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using other gear types

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	other	Bering Sea	1996	0.0%	0.0%	49.8%	50.2%	0.0%	100.0%
32 or less	other	Bering Sea	1997	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	other	Bering Sea	1998	0.0%	0.0%	9.5%	39.6%	50.9%	100.0%
32 or less	other	Bering Sea	1999	0.0%	0.0%	32.7%	67.3%	0.0%	100.0%
32 or less	other	Bering Sea	2000	0.0%	0.0%	39.4%	60.6%	0.0%	100.0%
32 or less	other	Central Gulf	1995	0.0%	0.0%	32.2%	32.2%	35.5%	100.0%
32 or less	other	Central Gulf	1996	0.0%	0.0%	14.5%	14.5%	71.0%	100.0%
32 or less	other	Central Gulf	1997	0.0%	0.0%	18.7%	18.7%	62.7%	100.0%
32 or less	other	Central Gulf	1998	0.0%	0.0%	25.4%	25.4%	49.2%	100.0%
32 or less	other	Central Gulf	1999	0.0%	0.0%	5.4%	5.4%	89.2%	100.0%
32 or less	other	Central Gulf	2000	0.0%	0.0%	9.2%	9.2%	81.5%	100.0%
32 or less	other	Western Gulf	1995	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	other	Western Gulf	1996	0.0%	0.0%	0.7%	99.3%	0.0%	100.0%
32 or less	other	Western Gulf	1997	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	other	Western Gulf	1998	0.0%	0.0%	29.8%	35.9%	34.3%	100.0%
32 or less	other	Western Gulf	1999	0.0%	0.0%	4.7%	4.8%	90.5%	100.0%
32 or less	other	Western Gulf	2000	0.0%	0.0%	32.8%	67.2%	0.0%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-27 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using longline gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	longline	Bering Sea	1995	0.0%	0.0%	6.2%	65.5%	28.4%	100.0%
33 to 59	longline	Bering Sea	1996	0.0%	0.0%	3.6%	56.4%	40.0%	100.0%
33 to 59	longline	Bering Sea	1997	0.0%	0.0%	4.8%	54.0%	41.2%	100.0%
33 to 59	longline	Bering Sea	1998	0.0%	0.0%	6.6%	47.7%	45.7%	100.0%
33 to 59	longline	Bering Sea	1999	0.0%	0.0%	3.5%	40.1%	56.3%	100.0%
33 to 59	longline	Bering Sea	2000	0.0%	0.0%	8.7%	89.2%	2.1%	100.0%
33 to 59	longline	Central Gulf	1995	0.0%	0.0%	14.3%	35.5%	50.2%	100.0%
33 to 59	longline	Central Gulf	1996	0.0%	0.0%	15.6%	35.7%	48.7%	100.0%
33 to 59	longline	Central Gulf	1997	0.0%	0.0%	15.5%	33.5%	51.0%	100.0%
33 to 59	longline	Central Gulf	1998	0.0%	0.0%	15.3%	29.9%	54.8%	100.0%
33 to 59	longline	Central Gulf	1999	0.0%	0.0%	13.1%	24.7%	62.2%	100.0%
33 to 59	longline	Central Gulf	2000	0.0%	0.0%	26.3%	51.1%	22.6%	100.0%
33 to 59	longline	Western Gulf	1995	0.0%	0.0%	8.1%	61.6%	30.3%	100.0%
33 to 59	longline	Western Gulf	1996	0.0%	0.0%	6.8%	53.4%	39.8%	100.0%
33 to 59	longline	Western Gulf	1997	0.0%	0.0%	6.2%	47.3%	46.5%	100.0%
33 to 59	longline	Western Gulf	1998	0.0%	0.0%	6.9%	43.4%	49.8%	100.0%
33 to 59	longline	Western Gulf	1999	0.0%	0.0%	7.1%	35.6%	57.3%	100.0%
33 to 59	longline	Western Gulf	2000	0.0%	0.0%	15.4%	75.6%	8.9%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-28 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using pot gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	pot	Bering Sea	1995	0.0%	0.0%	6.1%	13.8%	80.1%	100.0%
33 to 59	pot	Bering Sea	1996	0.0%	0.0%	34.6%	48.0%	17.4%	100.0%
33 to 59	pot	Bering Sea	1997	0.0%	0.0%	1.4%	46.2%	52.4%	100.0%
33 to 59	pot	Bering Sea	1998	0.0%	0.0%	4.0%	14.2%	81.8%	100.0%
33 to 59	pot	Bering Sea	1999	0.0%	0.0%	2.2%	24.6%	73.2%	100.0%
33 to 59	pot	Bering Sea	2000	0.0%	0.0%	4.3%	52.4%	43.2%	100.0%
33 to 59	pot	Central Gulf	1995	0.0%	0.0%	20.7%	21.3%	58.1%	100.0%
33 to 59	pot	Central Gulf	1996	0.0%	0.0%	22.3%	29.5%	48.3%	100.0%
33 to 59	pot	Central Gulf	1997	0.0%	0.0%	25.4%	26.6%	47.9%	100.0%
33 to 59	pot	Central Gulf	1998	0.0%	0.0%	23.7%	24.1%	52.2%	100.0%
33 to 59	pot	Central Gulf	1999	0.0%	0.0%	23.9%	24.5%	51.6%	100.0%
33 to 59	pot	Central Gulf	2000	0.1%	0.0%	34.9%	35.5%	29.5%	100.0%
33 to 59	pot	Western Gulf	1995	0.0%	0.0%	6.5%	8.0%	85.5%	100.0%
33 to 59	pot	Western Gulf	1996	0.0%	0.0%	17.3%	36.7%	46.0%	100.0%
33 to 59	pot	Western Gulf	1997	0.0%	0.0%	23.4%	24.8%	51.8%	100.0%
33 to 59	pot	Western Gulf	1998	0.0%	0.0%	17.8%	18.1%	64.0%	100.0%
33 to 59	pot	Western Gulf	1999	0.0%	0.0%	17.4%	20.3%	62.3%	100.0%
33 to 59	pot	Western Gulf	2000	0.0%	0.0%	31.3%	32.6%	36.2%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-29 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using trawl gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	trawl	Bering Sea	1995	4.0%	0.0%	0.1%	44.2%	51.6%	100.0%
33 to 59	trawl	Bering Sea	1996	2.2%	0.0%	0.2%	82.0%	15.6%	100.0%
33 to 59	trawl	Bering Sea	1997	2.6%	0.0%	0.1%	75.9%	21.4%	100.0%
33 to 59	trawl	Bering Sea	1998	3.2%	0.0%	1.2%	71.4%	24.1%	100.0%
33 to 59	trawl	Bering Sea	1999	3.3%	0.0%	1.2%	56.2%	39.3%	100.0%
33 to 59	trawl	Bering Sea	2000	6.6%	0.0%	0.1%	65.5%	27.8%	100.0%
33 to 59	trawl	Central Gulf	1995	2.5%	0.0%	13.6%	27.7%	56.2%	100.0%
33 to 59	trawl	Central Gulf	1996	2.0%	0.1%	18.7%	46.1%	33.2%	100.0%
33 to 59	trawl	Central Gulf	1997	9.3%	0.1%	12.9%	48.9%	28.8%	100.0%
33 to 59	trawl	Central Gulf	1998	9.2%	0.0%	9.9%	42.5%	38.4%	100.0%
33 to 59	trawl	Central Gulf	1999	3.7%	0.1%	7.9%	43.8%	44.5%	100.0%
33 to 59	trawl	Central Gulf	2000	2.7%	0.2%	23.9%	54.3%	19.0%	100.0%
									0.0%
33 to 59	trawl	Western Gulf	1995	5.8%	0.0%	9.8%	23.1%	61.3%	100.0%
33 to 59	trawl	Western Gulf	1996	9.1%	0.0%	22.1%	43.5%	25.3%	100.0%
33 to 59	trawl	Western Gulf	1997	7.6%	0.0%	24.1%	45.7%	22.5%	100.0%
33 to 59	trawl	Western Gulf	1998	5.9%	0.0%	20.8%	37.3%	36.1%	100.0%
33 to 59	trawl	Western Gulf	1999	8.4%	0.1%	21.5%	32.8%	37.3%	100.0%
33 to 59	trawl	Western Gulf	2000	8.1%	0.0%	29.7%	40.7%	21.5%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-30 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using jig gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	jig	Bering Sea	1995	0.0%	0.0%	15.7%	17.0%	67.3%	100.0%
33 to 59	jig	Bering Sea	1996	0.0%	0.0%	24.7%	25.5%	49.8%	100.0%
33 to 59	jig	Bering Sea	1997	0.0%	0.0%	39.0%	45.5%	15.5%	100.0%
33 to 59	jig	Bering Sea	1998	0.0%	0.0%	28.9%	28.9%	42.2%	100.0%
33 to 59	jig	Bering Sea	1999	0.0%	0.0%	11.7%	13.7%	74.6%	100.0%
33 to 59	jig	Bering Sea	2000	0.0%	0.0%	14.6%	48.5%	36.9%	100.0%
33 to 59	jig	Central Gulf	1995	0.0%	0.0%	12.9%	14.6%	72.5%	100.0%
33 to 59	jig	Central Gulf	1996	0.0%	0.0%	11.8%	12.7%	75.5%	100.0%
33 to 59	jig	Central Gulf	1997	0.0%	0.0%	11.4%	11.5%	77.1%	100.0%
33 to 59	jig	Central Gulf	1998	0.0%	0.0%	6.0%	6.1%	87.9%	100.0%
33 to 59	jig	Central Gulf	1999	0.0%	0.0%	7.0%	7.2%	85.8%	100.0%
33 to 59	jig	Central Gulf	2000	0.0%	0.0%	14.7%	15.8%	69.5%	100.0%
33 to 59	jig	Western Gulf	1995	0.0%	0.0%	2.1%	10.5%	87.5%	100.0%
33 to 59	jig	Western Gulf	1996	0.0%	0.0%	4.7%	13.6%	81.7%	100.0%
33 to 59	jig	Western Gulf	1997	0.0%	0.0%	3.6%	4.1%	92.3%	100.0%
33 to 59	jig	Western Gulf	1998	0.0%	0.0%	4.5%	5.7%	89.8%	100.0%
33 to 59	jig	Western Gulf	1999	0.0%	0.0%	7.6%	8.2%	84.2%	100.0%
33 to 59	jig	Western Gulf	2000	0.0%	0.0%	10.1%	16.5%	73.4%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-31 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using other gear types

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	other	Central Gulf	1995	0.0%	0.0%	11.5%	14.2%	74.3%	100.0%
33 to 59	other	Central Gulf	1996	0.0%	0.0%	3.0%	3.2%	93.8%	100.0%
33 to 59	other	Central Gulf	1997	0.0%	0.0%	10.3%	10.3%	79.4%	100.0%
33 to 59	other	Central Gulf	1998	0.0%	0.0%	1.0%	1.0%	97.9%	100.0%
33 to 59	other	Central Gulf	1999	0.0%	0.0%	5.0%	5.0%	90.0%	100.0%
33 to 59	other	Central Gulf	2000	0.0%	0.0%	33.7%	33.7%	32.6%	100.0%
33 to 59	other	Western Gulf	1995	0.1%	0.0%	0.0%	0.1%	99.9%	100.0%
33 to 59	other	Western Gulf	1996	0.0%	0.0%	0.5%	0.5%	99.0%	100.0%
33 to 59	other	Western Gulf	1997	0.0%	0.0%	0.7%	0.7%	98.5%	100.0%
33 to 59	other	Western Gulf	1998	0.0%	0.0%	0.4%	0.4%	99.1%	100.0%
33 to 59	other	Western Gulf	1999	0.0%	0.0%	0.6%	0.6%	98.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-32 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using longline gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	longline	Bering Sea	1995	0.0%	0.0%	3.5%	62.1%	34.5%	100.0%
60 to 124	longline	Bering Sea	1996	0.0%	0.0%	2.9%	53.5%	43.7%	100.0%
60 to 124	longline	Bering Sea	1997	0.0%	0.0%	13.7%	50.5%	35.8%	100.0%
60 to 124	longline	Bering Sea	1998	0.0%	0.0%	2.6%	46.2%	51.2%	100.0%
60 to 124	longline	Bering Sea	1999	0.0%	0.0%	2.2%	29.3%	68.4%	100.0%
60 to 124	longline	Bering Sea	2000	0.0%	0.0%	3.1%	89.4%	7.5%	100.0%
60 to 124	longline	Central Gulf	1995	0.0%	0.0%	14.4%	38.0%	47.6%	100.0%
60 to 124	longline	Central Gulf	1996	0.0%	0.0%	15.8%	38.8%	45.4%	100.0%
60 to 124	longline	Central Gulf	1997	0.0%	0.0%	14.4%	42.4%	43.2%	100.0%
60 to 124	longline	Central Gulf	1998	0.0%	0.0%	16.7%	35.3%	48.1%	100.0%
60 to 124	longline	Central Gulf	1999	0.0%	0.0%	11.2%	24.0%	64.9%	100.0%
60 to 124	longline	Central Gulf	2000	0.0%	0.0%	28.1%	60.3%	11.6%	100.0%
60 to 124	longline	Western Gulf	1995	0.0%	0.0%	8.8%	55.2%	36.0%	100.0%
60 to 124	longline	Western Gulf	1996	0.0%	0.0%	9.5%	52.5%	38.0%	100.0%
60 to 124	longline	Western Gulf	1997	0.0%	0.0%	9.3%	53.1%	37.6%	100.0%
60 to 124	longline	Western Gulf	1998	0.0%	0.0%	7.9%	48.2%	43.9%	100.0%
60 to 124	longline	Western Gulf	1999	0.0%	0.0%	5.6%	34.2%	60.1%	100.0%
60 to 124	longline	Western Gulf	2000	0.0%	0.0%	11.6%	79.8%	8.5%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-33 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using pot gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	pot	Bering Sea	1995	0.0%	0.0%	6.4%	8.5%	85.1%	100.0%
60 to 124	pot	Bering Sea	1996	0.0%	0.0%	13.0%	15.2%	71.9%	100.0%
60 to 124	pot	Bering Sea	1997	0.0%	0.0%	11.2%	12.4%	76.4%	100.0%
60 to 124	pot	Bering Sea	1998	0.0%	0.0%	7.0%	9.8%	83.2%	100.0%
60 to 124	pot	Bering Sea	1999	0.0%	0.0%	6.9%	11.0%	82.1%	100.0%
60 to 124	pot	Bering Sea	2000	0.0%	0.0%	11.6%	19.9%	68.4%	100.0%
60 to 124	pot	Central Gulf	1995	0.0%	0.0%	9.3%	15.8%	74.9%	100.0%
60 to 124	pot	Central Gulf	1996	0.0%	0.0%	14.4%	20.5%	65.1%	100.0%
60 to 124	pot	Central Gulf	1997	0.0%	0.0%	13.9%	23.0%	63.0%	100.0%
60 to 124	pot	Central Gulf	1998	0.0%	0.0%	20.9%	23.1%	56.1%	100.0%
60 to 124	pot	Central Gulf	1999	0.0%	0.0%	11.1%	16.1%	72.9%	100.0%
60 to 124	pot	Central Gulf	2000	0.1%	0.0%	26.0%	28.3%	45.5%	100.0%
60 to 124	pot	Western Gulf	1995	0.0%	0.0%	2.8%	11.4%	85.8%	100.0%
60 to 124	pot	Western Gulf	1996	0.0%	0.0%	4.7%	29.2%	66.2%	100.0%
60 to 124	pot	Western Gulf	1997	0.0%	0.0%	4.1%	21.6%	74.3%	100.0%
60 to 124	pot	Western Gulf	1998	0.0%	0.0%	2.3%	14.2%	83.5%	100.0%
60 to 124	pot	Western Gulf	1999	0.0%	0.0%	3.1%	13.4%	83.5%	100.0%
60 to 124	pot	Western Gulf	2000	0.0%	0.0%	8.8%	18.6%	72.6%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-34 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using trawl gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	trawl	Bering Sea	1995	33.5%	0.2%	9.5%	53.6%	3.2%	100.0%
60 to 124	trawl	Bering Sea	1996	30.2%	0.1%	13.4%	54.1%	2.2%	100.0%
60 to 124	trawl	Bering Sea	1997	28.8%	0.1%	13.7%	52.3%	5.1%	100.0%
60 to 124	trawl	Bering Sea	1998	26.3%	0.3%	12.8%	53.4%	7.2%	100.0%
60 to 124	trawl	Bering Sea	1999	27.7%	0.2%	10.0%	54.3%	7.9%	100.0%
60 to 124	trawl	Bering Sea	2000	29.2%	0.2%	13.4%	53.8%	3.4%	100.0%
60 to 124	trawl	Central Gulf	1995	9.2%	0.1%	15.0%	68.8%	6.9%	100.0%
60 to 124	trawl	Central Gulf	1996	8.0%	0.1%	22.9%	60.4%	8.6%	100.0%
60 to 124	trawl	Central Gulf	1997	13.0%	0.2%	22.4%	57.8%	6.6%	100.0%
60 to 124	trawl	Central Gulf	1998	18.2%	0.1%	15.8%	58.2%	7.8%	100.0%
60 to 124	trawl	Central Gulf	1999	17.0%	0.1%	19.2%	57.2%	6.6%	100.0%
60 to 124	trawl	Central Gulf	2000	15.0%	0.2%	23.3%	60.2%	1.4%	100.0%
60 to 124	trawl	Western Gulf	1995	4.4%	0.0%	3.0%	85.6%	7.0%	100.0%
60 to 124	trawl	Western Gulf	1996	7.2%	0.0%	3.6%	84.0%	5.2%	100.0%
60 to 124	trawl	Western Gulf	1997	4.1%	0.0%	4.5%	83.9%	7.5%	100.0%
60 to 124	trawl	Western Gulf	1998	4.2%	0.0%	4.8%	79.2%	11.8%	100.0%
60 to 124	trawl	Western Gulf	1999	5.8%	0.0%	5.8%	71.6%	16.7%	100.0%
60 to 124	trawl	Western Gulf	2000	10.4%	0.0%	11.9%	72.9%	4.9%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-35 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using jig gear

Vessel Length	Gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	other groundfish outside area	other species	total gross revenue
60 to 124	jig	Bering Sea	1995	0.0%	0.0%	2.3%	2.3%	95.4%	100.0%
60 to 124	jig	Bering Sea	1996	0.0%	0.0%	2.4%	2.4%	95.2%	100.0%
60 to 124	jig	Central Gulf	1998	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
60 to 124	jig	Central Gulf	1999	0.0%	0.0%	13.2%	14.2%	72.5%	100.0%
60 to 124	jig	Central Gulf	2000	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
60 to 124	jig	Western Gulf	1997	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
60 to 124	jig	Western Gulf	1998	0.0%	0.0%	1.2%	1.2%	97.7%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-36 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using longline gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	longline	Bering Sea	1996	0.0%	0.0%	4.5%	95.5%	0.0%	100.0%
125 or greater	longline	Bering Sea	1997	0.0%	0.0%	42.9%	51.9%	5.2%	100.0%
125 or greater	longline	Bering Sea	1999	0.0%	0.0%	2.3%	6.5%	91.2%	100.0%
125 or greater	longline	Bering Sea	2000	0.0%	0.0%	2.7%	22.4%	74.9%	100.0%
125 or greater	longline	Central Gulf	1995	0.0%	0.0%	6.7%	12.4%	80.9%	100.0%
125 or greater	longline	Central Gulf	1997	0.0%	0.0%	1.1%	1.1%	97.8%	100.0%
125 or greater	longline	Central Gulf	1998	0.0%	0.0%	0.1%	0.1%	99.8%	100.0%
125 or greater	longline	Central Gulf	1999	0.0%	0.0%	0.1%	0.1%	99.9%	100.0%
125 or greater	longline	Central Gulf	2000	0.0%	0.0%	0.2%	0.2%	99.6%	100.0%
125 or greater	longline	Western Gulf	1996	0.0%	0.0%	5.6%	5.7%	88.8%	100.0%
125 or greater	longline	Western Gulf	1997	0.0%	0.0%	10.7%	44.7%	44.6%	100.0%
125 or greater	longline	Western Gulf	1998	0.0%	0.0%	0.3%	0.3%	99.3%	100.0%
125 or greater	longline	Western Gulf	1999	0.0%	0.0%	0.0%	0.0%	99.9%	100.0%
125 or greater	longline	Western Gulf	2000	0.0%	0.0%	0.0%	0.4%	99.6%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-37 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using pot gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	pot	Bering Sea	1995	0.0%	0.0%	4.4%	4.8%	90.8%	100.0%
125 or greater	pot	Bering Sea	1996	0.0%	0.0%	6.8%	7.7%	85.5%	100.0%
125 or greater	pot	Bering Sea	1997	0.0%	0.0%	9.7%	10.2%	80.1%	100.0%
125 or greater	pot	Bering Sea	1998	0.0%	0.0%	4.0%	4.5%	91.5%	100.0%
125 or greater	pot	Bering Sea	1999	0.0%	0.0%	6.0%	7.3%	86.6%	100.0%
125 or greater	pot	Bering Sea	2000	0.0%	0.0%	17.3%	17.8%	64.9%	100.0%
125 or greater	pot	Central Gulf	1995	0.0%	0.0%	1.6%	1.6%	96.7%	100.0%
125 or greater	pot	Central Gulf	2000	0.0%	0.0%	11.4%	11.4%	77.2%	100.0%
125 or greater	pot	Western Gulf	1995	0.0%	0.0%	1.3%	1.7%	97.0%	100.0%
125 or greater	pot	Western Gulf	1996	0.0%	0.0%	3.4%	9.7%	86.9%	100.0%
125 or greater	pot	Western Gulf	1997	0.0%	0.0%	2.9%	12.7%	84.4%	100.0%
125 or greater	pot	Western Gulf	1998	0.0%	0.0%	1.5%	7.5%	91.0%	100.0%
125 or greater	pot	Western Gulf	1999	0.0%	0.0%	0.6%	3.8%	95.6%	100.0%
125 or greater	pot	Western Gulf	2000	0.0%	0.0%	8.0%	17.1%	74.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-38 Relative dependence on pollock as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using trawl gear

vessel length	gear	area	year	targeted pollock	non-targeted pollock	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	trawl	Bering Sea	1995	43.3%	0.0%	2.6%	52.6%	1.5%	100.0%
125 or greater	trawl	Bering Sea	1996	43.4%	0.0%	4.0%	51.1%	1.5%	100.0%
125 or greater	trawl	Bering Sea	1997	41.0%	0.2%	6.3%	51.8%	0.8%	100.0%
125 or greater	trawl	Bering Sea	1998	42.5%	0.1%	3.0%	51.6%	2.9%	100.0%
125 or greater	trawl	Bering Sea	1999	45.0%	0.1%	2.1%	49.0%	3.9%	100.0%
125 or greater	trawl	Bering Sea	2000	46.6%	0.0%	2.3%	49.9%	1.2%	100.0%
125 or greater	trawl	Central Gulf	1995	3.2%	0.0%	4.8%	90.0%	2.1%	100.0%
125 or greater	trawl	Central Gulf	1996	0.2%	0.0%	2.8%	93.1%	3.9%	100.0%
125 or greater	trawl	Central Gulf	1997	2.6%	0.0%	4.2%	91.9%	1.3%	100.0%
125 or greater	trawl	Central Gulf	1998	8.5%	0.0%	1.0%	87.4%	3.1%	100.0%
125 or greater	trawl	Central Gulf	1999	1.9%	0.0%	0.3%	92.7%	5.1%	100.0%
125 or greater	trawl	Western Gulf	1995	3.8%	0.0%	0.7%	92.7%	2.7%	100.0%
125 or greater	trawl	Western Gulf	1996	4.7%	0.0%	0.0%	90.3%	4.9%	100.0%
125 or greater	trawl	Western Gulf	1997	4.7%	0.0%	1.0%	93.1%	1.2%	100.0%
125 or greater	trawl	Western Gulf	1998	6.4%	0.0%	0.0%	91.4%	2.2%	100.0%
125 or greater	trawl	Western Gulf	1999	2.5%	0.0%	0.3%	86.7%	10.6%	100.0%
125 or greater	trawl	Western Gulf	2000	0.0%	0.0%	3.4%	96.5%	0.0%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

1.4.1.2 Pacific Cod

Tables C-39 through C-54 portray the relative dependence of the respective fishing fleets on targeted and non-targeted Pacific cod fishing revenues. The relative dependence is shown by the percentage contribution to total gross revenue from the fishery categories outlined above.

Table C-39 shows the relative dependence on Pacific cod of vessels 32 feet and less utilizing longline gear. With the regulatory incentive of the inshore waters fishery, it should be expected that the relative importance of Pacific cod for this group will have increased in recent years, and Table C-55 shows this to be the case. Aside from Pacific cod, most earnings for this vessel group are from salmon and halibut. The numbers of vessels in the Bering Sea (one to twelve) and the Western Gulf (fewer than 10 vessels) are much lower than the Central Gulf. In the Central Gulf, the numbers of vessels are relatively stable, varying only between 54 and 60, for the period from 1995 through 2000. In the Central Gulf fishing revenues range from \$1.9 million \$6.5 million.

Table C-40 shows the relative dependence on Pacific cod of vessels 32 feet and less utilizing pot gear. There are very few of vessels in this group, focusing primarily on salmon in the Central Gulf.

Table C-41 shows the relative dependence on Pacific cod of vessels 32 feet and less utilizing jig gear. Pacific cod clearly is an important species to this group, with Pacific cod earnings providing up to 32% of total revenues. There are modest numbers of vessels in this group. In the Bering Sea, the numbers of vessels in this group range from five to twenty-two. In the Central Gulf, the numbers of vessels are much higher, ranging from 12 to 42 vessels. In the Western Gulf, the number of vessels in the group ranged from one to fourteen Aside from Pacific cod, fishing revenues for this group come primarily from salmon, with halibut contributing a smaller proportion to total fishing revenues. In the Central Gulf, total revenues for the group ranges from \$550 thousand to \$1.3 million.

Table C-42 shows the relative dependence on Pacific cod of vessels 32 feet and less utilizing other gear. Pacific cod plays a modest role in overall fishing revenues for this category of vessels ranging from zero percent to 50%. There are very few of this category of vessels in the Bering Sea and Western Gulf (fewer than 10 in both instances). In the Central Gulf, they number between six and fifteen. Earnings for this group are primarily from other groundfish, within the same area, salmon and halibut, and ranged between \$20 thousand and \$115 thousand.

Table C-43 shows the relative dependence on Pacific cod of vessels between 33 and 59 feet utilizing longline gear. Pacific cod contributes a modest percentage to the overall revenues for this group. Earnings for this group come predominantly from Alaska groundfish, outside the area, and from other species, including salmon and halibut. This is a large fleet in the Central Gulf, ranging between 318 and 397 vessels. In the Bering Sea and Western Gulf, the number of vessels ranges from 13 to 39, and from 35 to 45, respectively. Gross earnings for this group in the Central Gulf varies between \$59 million and \$92 million.

Table C-44 shows the relative dependence on Pacific cod of vessels between 33 and 59 feet utilizing pot gear. Pacific cod is a very important species for this group, with percentage contributions ranging up to one quarter of total earnings. Aside from Pacific cod, other earnings come from a relatively even distribution of fisheries, including other groundfish, salmon and halibut, with a proportionally smaller contribution from crab and herring. In the Bering Sea, the numbers of vessels range between two and sixteen, for the period from 1995 to 2000. In the Central Gulf, the number of vessels ranged between 49 and 85. In the Western Gulf, the number of vessels ranged between 34 and 69. Gross earnings from fishing, for this group in the Central Gulf, varied from \$14 million to \$32 million, over this period.

Table C-45 shows the relative dependence on Pacific cod of vessels between <u>33 and 59 feet</u> utilizing <u>trawl gear</u>. This group includes the limit salmon seiners, that have added trawl gear. Pacific cod is a very important species for this vessel group, providing up to one quarter of total fishing revenue. In addition to Pacific cod, other important fisheries include other groundfish, as well as the traditional other species of salmon and halibut. The number of participants in this group varied considerably in the Bering Sea and Central Gulf, from two to fifteen vessels, and from 10 to 55 vessels, respectively, for the period from 1995 through 2000. In the Western Gulf, participation remained almost constant, only varying between 39 to 41 vessels. In the Central Gulf, fishing revenues ranged between $3.6 million and $22 million.

Table C-46 shows the relative dependence on Pacific cod of vessels between <u>33 and 59 feet</u> utilizing <u>jig gear</u>. Pacific cod has been an important species for this group throughout the 1995 through 2000 period in the Bering Sea. In the Central and Western Gulf , earnings from Pacific cod have grown steadily during the 1995 trough 2000 period, peaking in 2000. Aside from Pacific cod, most earnings come from other species, predominantly salmon and halibut. Other groundfish, both within the area and statewide, contribute important shares of revenues to this group, particularly in the Bering Sea. In the Bering Sea, the numbers of vessels range from five to eighteen. In the Central Gulf, the number of vessels ranged from 42 to 126. In the Western Gulf, the number of vessels ranged from 13 to 28. Total revenues in the Central Gulf ranged from $2.4 million to $11 million.

Table C-47 shows the relative dependence on Pacific cod of vessels between <u>33 and 59 feet</u> utilizing <u>other gear types</u>. There are no vessels in this group for the Bering Sea. In the Central Gulf, Pacific cod earnings have played an increasingly important role in overall fishing income, peaking in 2000 with a 32.2% contribution. In both the Central Gulf and Western Gulf, the number of vessels was relatively small, fewer than ten in most years. In addition to Pacific cod, most fishing revenues are from participation in the salmon fishery.

Table C-48 shows the relative dependence on Pacific cod of vessels between <u>60 and 124 feet</u> utilizing <u>longline gear</u>. Pacific cod contributed a relatively small proportion of total revenues to this group. There has been a downward trend in the number of vessels in each of the areas over the period from 1995 through 2000. In the Bering Sea, the number of vessels has declined from 40 to 22. In the Central Gulf, the numbers have declined from 134 to 92. In the Western Gulf, this group has declined from 50 to 35 vessels. Total earnings for the Central Gulf fishery has been between $35 million and $82 million for the 1995 through 2000 period.

Table C-49 shows the relative dependence on Pacific cod of vessels between <u>60 and 124 feet</u> utilizing <u>pot gear</u>. Pacific cod is an important species for this vessel group, contributing up to 20% of total fishing earnings. Aside from Pacific cod, this group focuses predominantly on crab. Over the 1995-2000 period, the number of vessels in this group has varied between 50 and 87 in the Bering Sea, 31 and 68 in the Central Gulf, and between 18 and 36 in the Western Gulf. In the Bering Sea, total ex-vessel revenues for the group range from $39 million to $79 million for the 1995 through 2000 period.

Table C-50 shows the relative dependence on Pacific cod of vessels between <u>60 and 124 feet</u> utilizing <u>trawl gear</u>. Pacific cod revenues contributed a modest share of total revenues for this group, ranging from 3.0% to 12%. In the Bering Sea, the number of vessels within this group varied between 65 and 83. The numbers in this group within the Central Gulf have recently declined slightly, varying to the lower end of the 54 to 83 vessel range. Similarly, their numbers in the Western Gulf have declined to the lower end of the 17 to 55 vessel range. The total revenues for the Bering Sea fleet varied from $66 million to $135 million.

Table C-51 shows the relative dependence on Pacific cod of vessels between <u>60 and 124 feet</u> utilizing <u>jig gear</u>. There are very few vessels in this group. In the Central Gulf, the vessels in this group are highly dependent upon Pacific cod for up to 50% of total fishing earnings.

Table C-52 shows the relative dependence on Pacific cod of vessels between 125 feet and greater utilizing longline gear. There are few vessels in this group with generally low levels of earnings from Pacific cod, with a couple of isolated exceptions. Most earnings for this vessel group come from other groundfish or halibut.

Table C-53 shows the relative dependence on Pacific cod of vessels between 125 feet and greater utilizing pot gear. Income from Pacific cod is of moderate importance to this vessel group, with an increasing trend for 2000 earnings. The largest share of total income for this group comes primarily from crab catches. There are fewer than 10 vessels in this group in each of the areas.

Table C-54 shows the relative dependence on Pacific cod of vessels between 125 feet and greater utilizing trawl gear. Pacific cod is a modest contributor to total earnings for this vessel class. In the Bering Sea, Central Gulf, and Western Gulf, the percent contribution from Pacific cod ranges from zero to a maximum of 4.2%. The numbers of vessels in the Bering Sea range from 22 to 36, over the 1995 through 2000 period. In the Central Gulf, the numbers ranged between five and eleven, while the numbers of vessels in the Western Gulf ranged between two and twenty-three Total revenues for the Bering Sea group have varied between $90 million and $206 million.

Table C-39 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using longline gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	longline	Bering Sea	1995	1.0%	0.0%	0.1%	6.8%	92.1%	100.0%
32 or less	longline	Bering Sea	1996	1.5%	0.0%	24.9%	30.1%	43.4%	100.0%
32 or less	longline	Bering Sea	1997	0.0%	0.1%	2.1%	9.7%	88.1%	100.0%
32 or less	longline	Bering Sea	1998	0.0%	0.0%	6.1%	18.9%	75.0%	100.0%
32 or less	longline	Bering Sea	1999	0.0%	0.1%	0.5%	0.6%	98.9%	100.0%
32 or less	longline	Bering Sea	2000	44.8%	5.2%	0.0%	50.0%	0.0%	100.0%
32 or less	longline	Central Gulf	1995	2.1%	0.1%	1.4%	7.0%	89.4%	100.0%
32 or less	longline	Central Gulf	1996	5.1%	0.0%	6.3%	20.0%	68.5%	100.0%
32 or less	longline	Central Gulf	1997	8.8%	0.1%	1.9%	12.0%	77.1%	100.0%
32 or less	longline	Central Gulf	1998	9.1%	0.2%	1.2%	13.5%	76.1%	100.0%
32 or less	longline	Central Gulf	1999	4.5%	0.2%	0.6%	6.3%	88.4%	100.0%
32 or less	longline	Central Gulf	2000	20.1%	0.4%	6.0%	27.3%	46.2%	100.0%
32 or less	longline	Western Gulf	1995	0.3%	0.1%	0.0%	2.3%	97.4%	100.0%
32 or less	longline	Western Gulf	1996	4.8%	0.0%	0.0%	39.0%	56.2%	100.0%
32 or less	longline	Western Gulf	1997	0.0%	0.1%	0.1%	13.6%	86.3%	100.0%
32 or less	longline	Western Gulf	1998	0.2%	0.2%	0.2%	45.7%	53.7%	100.0%
32 or less	longline	Western Gulf	1999	0.0%	0.0%	10.4%	32.4%	57.2%	100.0%
32 or less	longline	Western Gulf	2000	15.3%	0.1%	0.0%	15.4%	69.2%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-40 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using pot gear.

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	pot	Bering Sea	2000	11.5%	0.0%	0.0%	11.5%	76.9%	100.0%
32 or less	pot	Central Gulf	1995	4.5%	0.0%	0.0%	4.5%	90.9%	100.0%
32 or less	pot	Central Gulf	1996	1.4%	0.0%	0.0%	1.4%	97.1%	100.0%
32 or less	pot	Central Gulf	1997	1.0%	0.0%	0.0%	1.0%	98.0%	100.0%
32 or less	pot	Central Gulf	1999	6.3%	0.0%	1.1%	7.5%	85.0%	100.0%
32 or less	pot	Central Gulf	2000	0.0%	0.0%	50.0%	50.0%	0.0%	100.0%
32 or less	pot	Western Gulf	1995	5.3%	0.0%	0.0%	5.3%	89.4%	100.0%
32 or less	pot	Western Gulf	1997	0.5%	0.0%	0.0%	0.5%	98.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-41 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using jig gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	jig	Bering Sea	1995	14.2%	0.0%	0.4%	19.3%	66.0%	100.0%
32 or less	jig	Bering Sea	1996	17.0%	0.0%	2.1%	33.8%	47.1%	100.0%
32 or less	jig	Bering Sea	1997	10.0%	0.0%	2.5%	32.1%	55.4%	100.0%
32 or less	jig	Bering Sea	1998	19.7%	0.0%	2.1%	23.9%	54.2%	100.0%
32 or less	jig	Bering Sea	1999	32.2%	0.7%	1.3%	35.5%	30.3%	100.0%
32 or less	jig	Bering Sea	2000	6.3%	0.0%	0.0%	23.1%	70.6%	100.0%
32 or less	jig	Central Gulf	1995	0.0%	0.0%	7.9%	16.1%	76.0%	100.0%
32 or less	jig	Central Gulf	1996	0.1%	0.0%	6.5%	11.8%	81.7%	100.0%
32 or less	jig	Central Gulf	1997	12.9%	0.1%	7.3%	29.1%	50.7%	100.0%
32 or less	jig	Central Gulf	1998	16.3%	0.3%	5.9%	28.7%	48.8%	100.0%
32 or less	jig	Central Gulf	1999	14.0%	0.3%	2.7%	17.0%	66.0%	100.0%
32 or less	jig	Central Gulf	2000	28.4%	0.2%	4.1%	34.2%	33.1%	100.0%
32 or less	jig	Western Gulf	1995	0.1%	0.0%	13.6%	25.9%	60.4%	100.0%
32 or less	jig	Western Gulf	1996	0.0%	0.0%	13.6%	30.1%	56.3%	100.0%
32 or less	jig	Western Gulf	1997	0.9%	0.5%	9.0%	22.7%	67.0%	100.0%
32 or less	jig	Western Gulf	1998	2.5%	0.2%	11.9%	26.8%	58.5%	100.0%
32 or less	jig	Western Gulf	1999	7.7%	0.1%	1.4%	14.0%	76.8%	100.0%
32 or less	jig	Western Gulf	2000	15.5%	0.1%	4.4%	26.9%	53.1%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-42 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 32 feet or less using other gear types

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
32 or less	other	Bering Sea	1996	49.8%	0.0%	0.0%	50.2%	0.0%	100.0%
32 or less	other	Bering Sea	1997	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%
32 or less	other	Bering Sea	1998	3.3%	0.0%	6.2%	39.6%	50.9%	100.0%
32 or less	other	Bering Sea	1999	0.0%	0.0%	32.7%	67.3%	0.0%	100.0%
32 or less	other	Bering Sea	2000	0.0%	0.0%	39.4%	60.6%	0.0%	100.0%
32 or less	other	Central Gulf	1995	2.2%	0.0%	30.1%	32.2%	35.5%	100.0%
32 or less	other	Central Gulf	1996	0.0%	0.0%	14.5%	14.5%	71.0%	100.0%
32 or less	other	Central Gulf	1997	7.1%	0.2%	11.3%	18.7%	62.7%	100.0%
32 or less	other	Central Gulf	1998	20.6%	0.3%	4.5%	25.4%	49.2%	100.0%
32 or less	other	Central Gulf	1999	3.7%	0.0%	1.7%	5.4%	89.2%	100.0%
32 or less	other	Central Gulf	2000	9.2%	0.0%	0.0%	9.2%	81.5%	100.0%
32 or less	other	Western Gulf	1995	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%
32 or less	other	Western Gulf	1996	0.7%	0.0%	0.0%	99.3%	0.0%	100.0%
32 or less	other	Western Gulf	1997	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%
32 or less	other	Western Gulf	1998	10.5%	0.0%	19.3%	35.9%	34.3%	100.0%
32 or less	other	Western Gulf	1999	1.4%	0.0%	3.3%	4.8%	90.5%	100.0%
32 or less	other	Western Gulf	2000	0.0%	0.0%	32.8%	67.2%	0.0%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-43 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using longline gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	longline	Bering Sea	1995	1.8%	0.0%	4.4%	65.5%	28.4%	100.0%
33 to 59	longline	Bering Sea	1996	0.1%	0.0%	3.5%	56.4%	40.0%	100.0%
33 to 59	longline	Bering Sea	1997	0.1%	0.0%	4.6%	54.0%	41.2%	100.0%
33 to 59	longline	Bering Sea	1998	0.2%	0.0%	6.4%	47.7%	45.7%	100.0%
33 to 59	longline	Bering Sea	1999	0.2%	0.0%	3.3%	40.1%	56.3%	100.0%
33 to 59	longline	Bering Sea	2000	1.5%	0.0%	7.2%	89.2%	2.1%	100.0%
33 to 59	longline	Central Gulf	1995	1.7%	0.1%	12.5%	35.5%	50.2%	100.0%
33 to 59	longline	Central Gulf	1996	2.5%	0.0%	13.1%	35.7%	48.7%	100.0%
33 to 59	longline	Central Gulf	1997	3.1%	0.1%	12.4%	33.5%	51.0%	100.0%
33 to 59	longline	Central Gulf	1998	3.2%	0.1%	12.0%	29.9%	54.8%	100.0%
33 to 59	longline	Central Gulf	1999	3.9%	0.1%	9.2%	24.7%	62.2%	100.0%
33 to 59	longline	Central Gulf	2000	7.6%	0.2%	18.6%	51.1%	22.6%	100.0%
33 to 59	longline	Western Gulf	1995	0.0%	0.0%	8.1%	61.6%	30.3%	100.0%
33 to 59	longline	Western Gulf	1996	0.3%	0.0%	6.5%	53.4%	39.8%	100.0%
33 to 59	longline	Western Gulf	1997	0.0%	0.0%	6.2%	47.3%	46.5%	100.0%
33 to 59	longline	Western Gulf	1998	0.0%	0.0%	6.8%	43.4%	49.8%	100.0%
33 to 59	longline	Western Gulf	1999	0.1%	0.0%	6.9%	35.6%	57.3%	100.0%
33 to 59	longline	Western Gulf	2000	0.0%	0.0%	15.4%	75.6%	8.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-44 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using pot gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	pot	Bering Sea	1995	6.1%	0.0%	0.0%	13.8%	80.1%	100.0%
33 to 59	pot	Bering Sea	1996	1.1%	0.0%	33.6%	48.0%	17.4%	100.0%
33 to 59	pot	Bering Sea	1997	1.1%	0.0%	0.3%	46.2%	52.4%	100.0%
33 to 59	pot	Bering Sea	1998	4.0%	0.0%	0.0%	14.2%	81.8%	100.0%
33 to 59	pot	Bering Sea	1999	2.2%	0.0%	0.0%	24.6%	73.2%	100.0%
33 to 59	pot	Bering Sea	2000	4.3%	0.0%	0.0%	52.4%	43.2%	100.0%
33 to 59	pot	Central Gulf	1995	20.6%	0.0%	0.1%	21.3%	58.1%	100.0%
33 to 59	pot	Central Gulf	1996	20.6%	0.0%	1.7%	29.5%	48.3%	100.0%
33 to 59	pot	Central Gulf	1997	24.7%	0.0%	0.7%	26.6%	47.9%	100.0%
33 to 59	pot	Central Gulf	1998	23.1%	0.0%	0.6%	24.1%	52.2%	100.0%
33 to 59	pot	Central Gulf	1999	23.8%	0.0%	0.2%	24.5%	51.6%	100.0%
33 to 59	pot	Central Gulf	2000	34.6%	0.0%	0.4%	35.5%	29.5%	100.0%
33 to 59	pot	Western Gulf	1995	6.5%	0.0%	0.0%	8.0%	85.5%	100.0%
33 to 59	pot	Western Gulf	1996	12.2%	0.0%	5.1%	36.7%	46.0%	100.0%
33 to 59	pot	Western Gulf	1997	23.2%	0.0%	0.2%	24.8%	51.8%	100.0%
33 to 59	pot	Western Gulf	1998	17.8%	0.0%	0.0%	18.1%	64.0%	100.0%
33 to 59	pot	Western Gulf	1999	17.4%	0.0%	0.1%	20.3%	62.3%	100.0%
33 to 59	pot	Western Gulf	2000	31.3%	0.0%	0.0%	32.6%	36.2%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-45 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using trawl gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	trawl	Bering Sea	1995	0.0%	0.1%	4.0%	44.2%	51.6%	100.0%
33 to 59	trawl	Bering Sea	1996	0.1%	0.1%	2.2%	82.0%	15.6%	100.0%
33 to 59	trawl	Bering Sea	1997	0.0%	0.1%	2.6%	75.9%	21.4%	100.0%
33 to 59	trawl	Bering Sea	1998	1.2%	0.0%	3.2%	71.4%	24.1%	100.0%
33 to 59	trawl	Bering Sea	1999	0.1%	0.0%	4.3%	56.2%	39.3%	100.0%
33 to 59	trawl	Bering Sea	2000	0.0%	0.0%	6.6%	65.5%	27.8%	100.0%
33 to 59	trawl	Central Gulf	1995	11.9%	0.4%	3.9%	27.7%	56.2%	100.0%
33 to 59	trawl	Central Gulf	1996	13.3%	0.5%	6.9%	46.1%	33.2%	100.0%
33 to 59	trawl	Central Gulf	1997	10.0%	0.5%	11.8%	48.9%	28.8%	100.0%
33 to 59	trawl	Central Gulf	1998	8.0%	0.5%	10.6%	42.5%	38.4%	100.0%
33 to 59	trawl	Central Gulf	1999	6.5%	0.3%	4.8%	43.8%	44.5%	100.0%
33 to 59	trawl	Central Gulf	2000	17.5%	1.7%	7.5%	54.3%	19.0%	100.0%
33 to 59	trawl	Western Gulf	1995	9.7%	0.1%	5.8%	23.1%	61.3%	100.0%
33 to 59	trawl	Western Gulf	1996	21.9%	0.1%	9.2%	43.5%	25.3%	100.0%
33 to 59	trawl	Western Gulf	1997	24.0%	0.1%	7.7%	45.7%	22.5%	100.0%
33 to 59	trawl	Western Gulf	1998	20.7%	0.1%	5.9%	37.3%	36.1%	100.0%
33 to 59	trawl	Western Gulf	1999	21.4%	0.1%	8.5%	32.8%	37.3%	100.0%
33 to 59	trawl	Western Gulf	2000	29.6%	0.1%	8.2%	40.7%	21.5%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-46 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using jig gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	jig	Bering Sea	1995	15.7%	0.0%	0.0%	17.0%	67.3%	100.0%
33 to 59	jig	Bering Sea	1996	24.6%	0.0%	0.0%	25.5%	49.8%	100.0%
33 to 59	jig	Bering Sea	1997	39.0%	0.0%	0.1%	45.5%	15.5%	100.0%
33 to 59	jig	Bering Sea	1998	28.9%	0.0%	0.0%	28.9%	42.2%	100.0%
33 to 59	jig	Bering Sea	1999	11.7%	0.0%	0.0%	13.7%	74.6%	100.0%
33 to 59	jig	Bering Sea	2000	14.6%	0.0%	0.0%	48.5%	36.9%	100.0%
33 to 59	jig	Central Gulf	1995	0.9%	0.0%	12.0%	14.6%	72.5%	100.0%
33 to 59	jig	Central Gulf	1996	1.1%	0.0%	10.7%	12.7%	75.5%	100.0%
33 to 59	jig	Central Gulf	1997	8.9%	0.1%	2.4%	11.5%	77.1%	100.0%
33 to 59	jig	Central Gulf	1998	4.9%	0.0%	1.1%	6.1%	87.9%	100.0%
33 to 59	jig	Central Gulf	1999	6.6%	0.0%	0.4%	7.2%	85.8%	100.0%
33 to 59	jig	Central Gulf	2000	12.1%	0.1%	2.6%	15.8%	69.5%	100.0%
33 to 59	jig	Western Gulf	1995	1.1%	0.0%	1.0%	10.5%	87.5%	100.0%
33 to 59	jig	Western Gulf	1996	1.5%	0.0%	3.2%	13.6%	81.7%	100.0%
33 to 59	jig	Western Gulf	1997	3.0%	0.0%	0.5%	4.1%	92.3%	100.0%
33 to 59	jig	Western Gulf	1998	3.8%	0.0%	0.7%	5.7%	89.8%	100.0%
33 to 59	jig	Western Gulf	1999	7.0%	0.1%	0.5%	8.2%	84.2%	100.0%
33 to 59	jig	Western Gulf	2000	8.5%	0.1%	1.6%	16.5%	73.4%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-47 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 33 to 59 feet in length using other gear types.

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
33 to 59	other	Central Gulf	1995	0.0%	0.0%	11.5%	14.2%	74.3%	100.0%
33 to 59	other	Central Gulf	1996	0.0%	0.0%	3.0%	3.2%	93.8%	100.0%
33 to 59	other	Central Gulf	1997	3.3%	0.3%	6.8%	10.3%	79.4%	100.0%
33 to 59	other	Central Gulf	1998	0.1%	0.0%	0.9%	1.0%	97.9%	100.0%
33 to 59	other	Central Gulf	1999	4.6%	0.0%	0.4%	5.0%	90.0%	100.0%
33 to 59	other	Central Gulf	2000	32.2%	0.0%	1.5%	33.7%	32.6%	100.0%
33 to 59	other	Western Gulf	1995	0.0%	0.0%	0.1%	0.1%	99.9%	100.0%
33 to 59	other	Western Gulf	1996	0.0%	0.0%	0.5%	0.5%	99.0%	100.0%
33 to 59	other	Western Gulf	1997	0.5%	0.0%	0.2%	0.7%	98.5%	100.0%
33 to 59	other	Western Gulf	1998	0.4%	0.0%	0.0%	0.4%	99.1%	100.0%
33 to 59	other	Western Gulf	1999	0.6%	0.0%	0.0%	0.6%	98.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-48 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using longline gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	longline	Bering Sea	1995	0.3%	0.0%	3.1%	62.1%	34.5%	100.0%
60 to 124	longline	Bering Sea	1996	0.4%	0.0%	2.5%	53.5%	43.7%	100.0%
60 to 124	longline	Bering Sea	1997	10.1%	0.0%	3.6%	50.5%	35.8%	100.0%
60 to 124	longline	Bering Sea	1998	0.0%	0.0%	2.6%	46.2%	51.2%	100.0%
60 to 124	longline	Bering Sea	1999	0.2%	0.0%	2.0%	29.3%	68.4%	100.0%
60 to 124	longline	Bering Sea	2000	0.0%	0.0%	3.1%	89.4%	7.5%	100.0%
60 to 124	longline	Central Gulf	1995	0.5%	0.0%	13.9%	38.0%	47.6%	100.0%
60 to 124	longline	Central Gulf	1996	0.3%	0.0%	15.5%	38.8%	45.4%	100.0%
60 to 124	longline	Central Gulf	1997	0.1%	0.0%	14.3%	42.4%	43.2%	100.0%
60 to 124	longline	Central Gulf	1998	0.4%	0.0%	16.2%	35.3%	48.1%	100.0%
60 to 124	longline	Central Gulf	1999	0.4%	0.1%	10.7%	24.0%	64.9%	100.0%
60 to 124	longline	Central Gulf	2000	1.9%	0.1%	26.2%	60.3%	11.6%	100.0%
60 to 124	longline	Western Gulf	1995	0.0%	0.0%	8.8%	55.2%	36.0%	100.0%
60 to 124	longline	Western Gulf	1996	0.1%	0.0%	9.4%	52.5%	38.0%	100.0%
60 to 124	longline	Western Gulf	1997	1.5%	0.0%	7.8%	53.1%	37.6%	100.0%
60 to 124	longline	Western Gulf	1998	0.0%	0.0%	7.9%	48.2%	43.9%	100.0%
60 to 124	longline	Western Gulf	1999	0.0%	0.0%	5.6%	34.2%	60.1%	100.0%
60 to 124	longline	Western Gulf	2000	0.0%	0.0%	11.6%	79.8%	8.5%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-49 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using pot gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	pot	Bering Sea	1995	6.4%	0.0%	0.0%	8.5%	85.1%	100.0%
60 to 124	pot	Bering Sea	1996	12.9%	0.0%	0.0%	15.2%	71.9%	100.0%
60 to 124	pot	Bering Sea	1997	11.2%	0.0%	0.0%	12.4%	76.4%	100.0%
60 to 124	pot	Bering Sea	1998	7.0%	0.0%	0.0%	9.8%	83.2%	100.0%
60 to 124	pot	Bering Sea	1999	6.8%	0.0%	0.1%	11.0%	82.1%	100.0%
60 to 124	pot	Bering Sea	2000	11.2%	0.0%	0.5%	19.9%	68.4%	100.0%
60 to 124	pot	Central Gulf	1995	9.2%	0.0%	0.1%	15.8%	74.9%	100.0%
60 to 124	pot	Central Gulf	1996	14.4%	0.0%	0.1%	20.5%	65.1%	100.0%
60 to 124	pot	Central Gulf	1997	13.7%	0.0%	0.2%	23.0%	63.0%	100.0%
60 to 124	pot	Central Gulf	1998	20.6%	0.0%	0.2%	23.1%	56.1%	100.0%
60 to 124	pot	Central Gulf	1999	11.0%	0.0%	0.0%	16.1%	72.9%	100.0%
60 to 124	pot	Central Gulf	2000	25.9%	0.0%	0.2%	28.3%	45.5%	100.0%
60 to 124	pot	Western Gulf	1995	2.7%	0.0%	0.0%	11.4%	85.8%	100.0%
60 to 124	pot	Western Gulf	1996	4.7%	0.0%	0.0%	29.2%	66.2%	100.0%
60 to 124	pot	Western Gulf	1997	4.1%	0.0%	0.0%	21.6%	74.3%	100.0%
60 to 124	pot	Western Gulf	1998	2.3%	0.0%	0.0%	14.2%	83.5%	100.0%
60 to 124	pot	Western Gulf	1999	3.1%	0.0%	0.0%	13.4%	83.5%	100.0%
60 to 124	pot	Western Gulf	2000	8.8%	0.0%	0.0%	18.6%	72.6%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-50 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using trawl gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	trawl	Bering Sea	1995	8.1%	0.4%	34.7%	53.6%	3.2%	100.0%
60 to 124	trawl	Bering Sea	1996	12.6%	0.4%	30.7%	54.1%	2.2%	100.0%
60 to 124	trawl	Bering Sea	1997	12.4%	0.2%	29.9%	52.3%	5.1%	100.0%
60 to 124	trawl	Bering Sea	1998	12.4%	0.3%	26.7%	53.4%	7.2%	100.0%
60 to 124	trawl	Bering Sea	1999	9.8%	0.1%	27.9%	54.3%	7.9%	100.0%
60 to 124	trawl	Bering Sea	2000	13.2%	0.1%	29.5%	53.8%	3.4%	100.0%
60 to 124	trawl	Central Gulf	1995	9.4%	0.7%	14.1%	68.8%	6.9%	100.0%
60 to 124	trawl	Central Gulf	1996	10.3%	0.4%	20.3%	60.4%	8.6%	100.0%
60 to 124	trawl	Central Gulf	1997	11.6%	1.1%	22.9%	57.8%	6.6%	100.0%
60 to 124	trawl	Central Gulf	1998	8.3%	1.0%	24.7%	58.2%	7.8%	100.0%
60 to 124	trawl	Central Gulf	1999	13.4%	1.2%	21.6%	57.2%	6.6%	100.0%
60 to 124	trawl	Central Gulf	2000	9.5%	3.2%	25.6%	60.2%	1.4%	100.0%
60 to 124	trawl	Western Gulf	1995	2.9%	0.0%	4.4%	85.6%	7.0%	100.0%
60 to 124	trawl	Western Gulf	1996	3.5%	0.1%	7.2%	84.0%	5.2%	100.0%
60 to 124	trawl	Western Gulf	1997	3.3%	0.1%	5.2%	83.9%	7.5%	100.0%
60 to 124	trawl	Western Gulf	1998	4.7%	0.1%	4.2%	79.2%	11.8%	100.0%
60 to 124	trawl	Western Gulf	1999	5.7%	0.0%	5.9%	71.6%	16.7%	100.0%
60 to 124	trawl	Western Gulf	2000	11.5%	0.1%	10.6%	72.9%	4.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-51 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 60 to 124 feet in length using jig gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
60 to 124	jig	Bering Sea	1995	2.3%	0.0%	0.0%	2.3%	95.4%	100.0%
60 to 124	jig	Bering Sea	1996	2.4%	0.0%	0.0%	2.4%	95.2%	100.0%
60 to 124	jig	Central Gulf	1998	48.9%	0.0%	1.1%	50.0%	0.0%	100.0%
60 to 124	jig	Central Gulf	1999	13.0%	0.1%	0.2%	14.2%	72.5%	100.0%
60 to 124	jig	Central Gulf	2000	50.0%	0.0%	0.0%	50.0%	0.0%	100.0%
60 to 124	jig	Western Gulf	1997	0.0%	0.0%	0.0%	0.0%	100.0%	100.0%
60 to 124	jig	Western Gulf	1998	1.2%	0.0%	0.0%	1.2%	97.7%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-52 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using longline gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	longline	Bering Sea	1996	2.6%	0.0%	1.9%	95.5%	0.0%	100.0%
125 or greater	longline	Bering Sea	1997	36.8%	0.9%	5.2%	51.9%	5.2%	100.0%
125 or greater	longline	Bering Sea	1999	2.3%	0.0%	0.0%	6.5%	91.2%	100.0%
125 or greater	longline	Bering Sea	2000	2.6%	0.0%	0.0%	22.4%	74.9%	100.0%
125 or greater	longline	Central Gulf	1995	0.0%	0.0%	6.7%	12.4%	80.9%	100.0%
125 or greater	longline	Central Gulf	1997	0.0%	0.0%	1.1%	1.1%	97.8%	100.0%
125 or greater	longline	Central Gulf	1998	0.0%	0.0%	0.1%	0.1%	99.8%	100.0%
125 or greater	longline	Central Gulf	1999	0.0%	0.0%	0.0%	0.1%	99.9%	100.0%
125 or greater	longline	Central Gulf	2000	0.0%	0.0%	0.1%	0.2%	99.6%	100.0%
125 or greater	longline	Western Gulf	1996	0.0%	0.0%	5.6%	5.7%	88.8%	100.0%
125 or greater	longline	Western Gulf	1997	5.6%	0.0%	5.1%	44.7%	44.6%	100.0%
125 or greater	longline	Western Gulf	1998	0.0%	0.0%	0.3%	0.3%	99.3%	100.0%
125 or greater	longline	Western Gulf	1999	0.0%	0.0%	0.0%	0.0%	99.9%	100.0%
125 or greater	longline	Western Gulf	2000	0.0%	0.0%	0.0%	0.4%	99.6%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

Table C-53 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using pot gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	pot	Bering Sea	1995	4.4%	0.0%	0.0%	4.8%	90.8%	100.0%
125 or greater	pot	Bering Sea	1996	6.8%	0.0%	0.0%	7.7%	85.5%	100.0%
125 or greater	pot	Bering Sea	1997	9.7%	0.0%	0.0%	10.2%	80.1%	100.0%
125 or greater	pot	Bering Sea	1998	4.0%	0.0%	0.0%	4.5%	91.5%	100.0%
125 or greater	pot	Bering Sea	1999	6.0%	0.0%	0.0%	7.3%	86.6%	100.0%
125 or greater	pot	Bering Sea	2000	17.2%	0.0%	0.1%	17.8%	64.9%	100.0%
125 or greater	pot	Central Gulf	1995	1.6%	0.0%	0.0%	1.6%	96.7%	100.0%
125 or greater	pot	Central Gulf	2000	11.4%	0.0%	0.0%	11.4%	77.2%	100.0%
125 or greater	pot	Western Gulf	1995	1.3%	0.0%	0.0%	1.7%	97.0%	100.0%
125 or greater	pot	Western Gulf	1996	3.4%	0.0%	0.0%	9.7%	86.9%	100.0%
125 or greater	pot	Western Gulf	1997	2.9%	0.0%	0.0%	12.7%	84.4%	100.0%
125 or greater	pot	Western Gulf	1998	1.5%	0.0%	0.0%	7.5%	91.0%	100.0%
125 or greater	pot	Western Gulf	1999	0.6%	0.0%	0.0%	3.8%	95.6%	100.0%
125 or greater	pot	Western Gulf	2000	8.0%	0.0%	0.0%	17.1%	74.9%	100.0%

Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.

Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.

Table C-54 Relative dependence on Pacific cod as a percentage of total gross revenue by vessel length, gear and area 1995-2000; vessels 125 feet or greater using trawl gear

vessel length	gear	area	year	targeted P. cod	non-targeted P. cod	other groundfish in area	Alaska groundfish outside area	other species	total gross revenue
125 or greater	trawl	Bering Sea	1995	1.3%	0.2%	44.4%	52.6%	1.5%	100.0%
125 or greater	trawl	Bering Sea	1996	3.2%	0.3%	44.0%	51.1%	1.5%	100.0%
125 or greater	trawl	Bering Sea	1997	2.3%	0.3%	44.9%	51.8%	0.8%	100.0%
125 or greater	trawl	Bering Sea	1998	2.5%	0.3%	42.7%	51.6%	2.9%	100.0%
125 or greater	trawl	Bering Sea	1999	1.8%	0.2%	45.2%	49.0%	3.9%	100.0%
125 or greater	trawl	Bering Sea	2000	1.9%	0.2%	46.8%	49.9%	1.2%	100.0%
125 or greater	trawl	Central Gulf	1995	4.2%	0.0%	3.8%	90.0%	2.1%	100.0%
125 or greater	trawl	Central Gulf	1996	2.8%	0.0%	0.2%	93.1%	3.9%	100.0%
125 or greater	trawl	Central Gulf	1997	0.7%	0.1%	6.0%	91.9%	1.3%	100.0%
125 or greater	trawl	Central Gulf	1998	0.9%	0.1%	8.5%	87.4%	3.1%	100.0%
125 or greater	trawl	Central Gulf	1999	0.3%	0.0%	1.9%	92.7%	5.1%	100.0%
125 or greater	trawl	Western Gulf	1995	0.7%	0.0%	3.9%	92.7%	2.7%	100.0%
125 or greater	trawl	Western Gulf	1996	0.0%	0.0%	4.7%	90.3%	4.9%	100.0%
125 or greater	trawl	Western Gulf	1997	1.0%	0.0%	4.7%	93.1%	1.2%	100.0%
125 or greater	trawl	Western Gulf	1998	0.0%	0.0%	6.4%	91.4%	2.2%	100.0%
125 or greater	trawl	Western Gulf	1999	0.2%	0.0%	2.5%	86.7%	10.6%	100.0%
125 or greater	trawl	Western Gulf	2000	3.4%	0.0%	0.0%	96.5%	0.0%	100.0%
Source: State of Alaska fish ticket files (including halibut) and Commercial Fisheries Entry Commission Vessel License Files.									
Data analysis by Elaine Dinneford, NPFMC Fisheries Analyst, May 2001.									

1.4.1.3 Atka Mackerel

The data analyses showed almost no catches of Atka mackerel by catcher vessels in the various length and gear categories discussed above. A few sporadic catches appeared for several years, showing relatively low volume and very low prices, and indicating sales of incidentally caught Atka mackerel. This species is a targeted fishery of the catcher/processor fleet and, therefore, does not appear in the analysis of catcher boat landings and earnings.

1.4.2 Gross Revenue Effects

The overall analysis of the impacts of the alternatives on gross revenues was summarized in the cost-benefit analysis in Section 1.3.3.1 of this RIR. As noted there, the alternatives provide for (potential) maximum gross revenues ranging between $973 million and $1.358 billion; and placed from $28 million to $372 million in gross revenues "at risk", because of limitations on fishing in critical habitat.

Refer to section 1.3.3.1 for a detailed discussion of the approach used to estimate the changes in gross revenues. However, the "Benefit/Cost" overview in Section 1.3.3.1 was highly aggregated and did not break the impacts out by species, management area, or fleet segment. This section of the distributional analysis provides a much more disaggregated presentation of the results.

This section is divided into three subsections, corresponding to the three main categories of gross revenues impacts reviewed in the gross revenues analysis. While the alternatives contain numerous provisions that may impact the profitability of the fishing fleets and fish processors, the gross revenues analysis focused on these three categories, because: (a) these were thought to be the most significant impacts, and (b) because they lent themselves to estimation. The three impacts were: (1) the impact that the alternative had on the overall TAC allowed in a management area; (2) the impact of preventing vessels of different categories from fishing within critical habitat; (3) the impact of limiting the catch that vessels of different categories could take from critical habitat.

Each of the alternatives has different implications for TACs. Several alternatives contain global control rules, or other rules that could reduce harvests below the TACs that might otherwise be allowed. Alternatives also contain provisions imposing quarterly or other seasonal harvest limits within a year. These can often have the effect of "moving" retained harvest from one season to another. This movement can have gross revenue implications because prices received for fish can be much higher at one season of the year than another. Fish taken during the winter roe season at the start of the year can be much more valuable than fish taken later in the year. One subsection in this section presents the results of the impacts of the alternatives on TACs.

The analysis evaluates two categories of fishery effects associated with critical habitat. These categories are defined by the type of restrictions imposed on fishing in these areas. In the first, 'closed' critical habitat, no fishing activity is permitted, (depending upon the alternative) by one or more vessel categories.
In the second, 'open' critical habitat, fishing is allowed, subject to harvest limits specially designed for that area of critical habitat. Fish production from these areas would be constrained to the extent that the harvest limit is below the amounts that the fishermen would have taken if the limit had not been in place.

Two separate subsections of this section look at (a) the gross revenue impacts of the restrictions in 'closed' critical habitat, and (b) the implications for gross revenues of harvest limits imposed in 'open' critical habitat.

In this document, gross revenues that are impacted in critical habitat, whether the habitat is 'open' or 'closed', are described as "at risk." The revenues are treated as "at risk", rather than "foregone", because they may be made up (to a greater or lesser extent) by fishing operations that change their patterns of activity and fish more heavily outside of critical habitat. This treatment of revenue impacts, from 'critical habitat limits', differs from the treatment of revenue impacts caused by explicit TAC provisions. Reduced revenues resulting from stricter TAC provisions are treated as "foregone." In other words, the revenues associated with a given set of TAC provisions are considered the 'maximum potential revenues' associated with the alternative. A comparison of two alternatives, such as Alternatives 1 and 2, on the basis of TAC impacts, is a comparison of maximum potential revenues from each alternative.

Impacts of TAC limitations on gross revenues

Tables C-55 and C-56 summarize information on the impacts of the TAC provisions in the alternatives on the maximum potential harvests, and gross revenues, that may be taken by the different fleets. Table C-55 provides the information for fleets operating in the GOA, while Table C-56 provides similar information for fleets operating in the BSAI. Detailed descriptions of the TAC provisions may be found in Section 2.3 of this SEIS.

Tables C-55 and C-56 have the same format. The two columns along the left hand side sort the fleets by their target species, gear type, and processing mode. CDQ operations are not broken out by gear type; harvests and gross revenues for all gear types have been treated together, in one category, for each species.
The vessel class descriptions are followed by six columns, summarizing the maximum potential gross revenue estimate for that fleet, under the five alternatives (as well as, Option 3 associated with Alternative 4). These were obtained by estimating the tons of fish that would be available under each of the alternatives and by monetizing those tons with a price reflecting the first wholesale price per retained ton of harvest. Tons were valued with prices that varied, depending on the half of the year during which the fish were projected to be harvested.

Finally, the last five columns in these tables calculate the difference between the gross revenues projected for each fleet under Alternative 1, and the gross revenues projected under each of the other alternatives. The gross revenues for each alternative were subtracted from the gross revenues for Alternative 1. This approach effectively treats Alternative 1, "No action," as a baseline from which the relative impacts of the other alternatives may be determined.

In the GOA, the potential maximum gross revenues from Alternatives 1, 4, and 5 are very similar. While Alternative 5 contains a global control rule, it doesn't bind in this instance. Alternatives 4 and 5 do not depend heavily on TAC limits to protect the Steller sea lions. As a practical matter, it is difficult to say that there is any significant difference on the basis of this criterion between these alternatives. The differences that appear in these tables are probably dwarfed by the margin of error for each of the estimates. Alternative 3 appears to limit harvests and revenues somewhat more than Alternatives 1, 4, and 5, however the difference is still relatively small and may also be inconsequential when compared to the likely margin for error.

GOA Alternative 2, however, imposes strict TAC limits on the fishery and goes to great lengths to evenly distribute the flow of harvest during the year. This results in lower harvests overall, and significant "movement" of harvests from the first half of the year to the second. This latter impact means that fishermen can expect to receive a lower price for their fish. The result is that Alternative 2 leads to a large decrease in gross revenues during the year, compared to the other alternatives. Alternative 2 yields an estimated gross revenue which is about $52 million less than that estimated for Alternative 1.

Table C-56 summarizes the maximum potential gross revenue information for the BSAI. The pattern of results appears to be very similar, albeit on a substantially larger scale, to that revealed for the Gulf. Overall, the estimated gross revenues for Alternatives 1, 4, and 5 are sufficiently close together that it is hard to say there are significant differences between them. Alternative 3 also seems to be fairly close to Alternatives 1, 4, and 5. However Alternative 2, again, imposes large reductions in annual TACs and its provisions to even out the harvest over the year mean that less fish are harvested in the winter, when the price is higher. This combination of provisions leads to a large reduction in the estimated maximum potential gross revenues, under Alternative 2. Alternative 2 leads to a reduction in maximum gross revenues of about $332 million, as compared with the estimate for Alternative 1 (or about a 27% decline).

Table C-55 GOA TAC impacts

Species	Fleet	Maximum Potential Gross Revenues by Alternative						Difference Between Alternative 1 gross and gross for Listed Alternative (Alt 1 - Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka mack.	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Jig	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
Pacific Cod	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Fixed<60	25.76	13.34	18.68	22.48	22.48	18.68	12.42	7.08	3.28	3.28	7.08
	Jig	1.21	3.43	6.52	4.78	4.78	6.52	-2.22	-5.31	-3.56	-3.56	-5.31
	Longline Catcher Vessel	1.02	0.63	1.12	1.07	1.07	1.12	0.39	-0.10	-0.05	-0.05	-0.10
	Longline Catcher/Processor	2.44	0.77	0.98	1.48	1.48	0.98	1.68	1.46	0.97	0.97	1.46
	Pot Catcher Vessel	9.16	8.45	13.75	12.23	12.23	13.75	0.71	-4.60	-3.08	-3.08	-4.60
	Pot Catcher;/Processor	3.75	4.84	7.10	5.16	5.16	7.10	-1.09	-3.35	-1.41	-1.41	-3.35
	Trawl Catcher Vessel - S	11.82	3.85	5.19	7.53	7.53	5.19	7.97	6.63	4.29	4.29	6.63
	Trawl Catcher Vessem - M	18.17	8.90	16.56	16.97	16.97	16.56	9.27	1.62	1.20	1.20	1.62
	Trawl Catcher Vessel - L	0.54	0.15	0.25	0.38	0.38	0.25	0.39	0.28	0.16	0.16	0.28
	Trawl Catcher/Processor - AFA	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	Trawl Catcher/Processor - H&G	0.97	0.92	1.88	1.35	1.35	1.88	0.05	-0.90	-0.38	-0.38	-0.90
Pollock	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Catcher Vessel - shoreside	48.09	25.22	43.48	56.31	56.31	54.53	22.87	4.61	-8.21	-8.21	-6.44
	Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
	Mothership	0	0	0	0	0	0	0	0	0	0	0
Column Totals		122.96	70.51	115.53	129.74	129.74	126.58	52.45	7.43	-6.79	-6.79	-3.62

Note: Values are reported in millions of dollars.

Table C-56 BSAI TAC impacts

Species	Fleet	Maximum Potential Gross Revenues by Alternative						Difference Between Alternative 1 gross and gross for listed alternative (Alt 1 - Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka mack.	CDQ	2.48	0.82	2.49	2.48	2.48	2.48	1.66	-0.01	-0.01	-0.01	0
	Jig	0.08	0.03	0.06	0.08	0.08	0.08	0.05	0.02	0	0	0
	Trawl Catcher/Processor	30.54	10.08	30.58	30.54	30.54	30.54	20.46	-0.04	0	0	0
Pacific Cod	CDQ	22.68	12.51	40.81	24.9	24.9	40.81	10.17	-18.13	-2.22	-2.22	-18.13
	Fixed<60	0.10	0.17	0.13	0.1	0.1	0.13	-0.06	-0.02	0	0	-0.02
	Jig	0.22	0.38	0.39	0.24	0.24	0.39	-0.16	-0.17	-0.02	-0.02	-0.17
	Longline Catcher Vessel	1.99	0.32	0.88	1.89	1.89	0.88	1.67	1.11	0.1	0.1	1.11
	Longline Catcher/Processor	112.79	106.17	130.57	114.73	114.73	130.57	6.62	-17.78	-1.94	-1.94	-17.78
	Pot Catcher Vessel	15.36	7.68	11.56	14.9	14.9	11.56	7.68	3.80	0.46	0.46	3.80
	Pot Catcher/Processor	5.63	4.14	7.20	5.81	5.81	7.20	1.49	-1.56	-0.18	-0.18	-1.56
	Trawl Catcher Vessel - S	0.01	0	0	0.01	0.01	0	0	0	0	0	0
	Trawl Catcher Vessel - M	37.38	16.60	21.03	35.4	35.4	21.03	20.78	16.35	1.98	1.98	16.35
	Trawl Catcher Vessel - L	9.35	3.45	4.84	8.84	8.84	4.84	5.90	4.51	0.51	0.51	4.51
	Trawl Catcher/Processor - AFA	6.89	2.24	2.81	6.52	6.52	2.81	4.66	4.08	0.37	0.37	4.08
	Trawl Catcher/Processor - H&G	12.32	7.49	7.55	11.76	11.76	7.55	4.83	4.77	0.56	0.56	4.77
Pollock	CDQ	101.88	79.00	99.28	97.62	97.62	97.62	22.88	2.60	4.26	4.26	4.26
	Catcher Vessel - shoreside	435.07	310.45	432.36	425.53	425.53	425.53	124.63	2.72	9.55	9.55	9.55
	Catcher Processor	352.04	272.99	342.75	337.33	337.33	337.33	79.06	9.29	14.71	14.71	14.71
	Mothership	88.01	68.26	85.69	84.33	84.33	84.33	19.75	2.32	3.68	3.68	3.68
Column total		1,234.83	902.76	1,220.98	1,203.01	1,203.01	1,205.69	332.06	13.84	31.81	31.81	29.14

Note: Values are reported in millions of dollars.

'Closed' Critical Habitat Impacts

Tables C-57 and C-58 summarize information on the impacts of the provisions in the alternatives that close critical habitat areas to different classes of vessels. Table C-57 provides the information for fleets operating in the GOA, while Table C-58 provides similar information for fleets operating in the BSAI. Detailed descriptions of the TAC provisions that close critical habitat areas to different vessel classes may be found in Section 2.3 of this SEIS.

The format of Tables C-57 and C-58 is like the format in Tables C-55 and C-56 on the TAC impacts. Two columns on the right identify the target species and the fleet. The next six columns summarize the total gross revenues placed "at risk" by specific provisions of each alternative that prevent certain classes of vessels from fishing within critical habitat (i.e., this critical habitat is 'closed' to these vessels). The next five columns compare the gross revenues placed "at risk" by Alternatives 2 to 5, with the gross revenues placed "at risk" by Alternative 1. Alternative 1 is the "no action" alternative. It is treated here as a baseline against which the other alternatives are compared. Note that the reported values in this column were calculated by subtracting the gross "at risk" from each alternative from the gross "at risk" from Alternative 1. Because Alternatives 2 through 5 tend to place larger amounts of gross revenues "at risk" in 'closed' areas than Alternative 1, the values in the last five columns of Tables C-57 and C-58 tend to be negative. All of the column totals are negative.

In the GOA, the Alternative 2 has the greatest impact, followed by Alternatives 3, 4.3, 4 and 5. Estimation errors may be larger than the difference in revenues "at risk" between any two alternatives next to each other in the ranking. Alternative 2 is the "Low and slow" alternative, designed to provide strong protection for Steller sea lions. Alternative 3 is the RPA associated with the November 2000 NMFS Biological Opinion. Alternative 4.3 is a version of the alternative proposed by the NMFMC Steller sea lion committee in the Spring of 2001. This version includes a GOA option for Pacific cod that establishes a system of bands along the coast. Bands are associated with different levels of restriction on fishing activity, by different vessel classes. The restrictions become tighter for bands closer to the shore. Alternative 4 is the NPFMC's RPA committee's proposal. The elements in it reflect an effort by the different fishing sectors to maintain their production, as much as possible, while eliminating jeopardy for the sea lions. Alternative 5 represents the fishery as it was in 2000, without the trawl closure, but with some additional constraints on the Pacific cod fishery.

In the BSAI, Alternatives 2 and 3 also appear to impact gross revenues more than Alternatives 4 and 5. The provisions in the GOA, that differentiate 4 from 4.3 there, do not affect the BSAI. Thus, in the BSAI, 4.3 has the same estimated impact as 4. While the pattern of effects are very similar in the GOA and the BSAI, the scale is much larger in the BSAI. Alternative 2 places about $246 million more revenues "at risk", than Alternative 1, while Alternative 3 appears to place about $187 more "at risk", there.

Table C-57 GOA closed critical habitat impacts

Species	Fleet	Gross Revenues Placed "at risk" by Alternative						Difference Between Alternative 1 Gross and Gross for Listed Alternative (Alt 1 - Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka Mackerel	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Jig	0	0	0	0	0	0	0	0	0	0	0
	Trawl CP	0	0	0	0	0	0	0	0	0	0	0
Pacific Cod	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Fixed<60	0.15	1.14	6.79	2.20	1.49	0.06	-0.99	-6.64	-2.06	-1.34	0.09
	Jig	0.03	0.70	1.73	0	0	0.04	-0.66	-1.70	0.03	0.03	-0.01
	Longline Catcher Vessel	0	0.06	0.28	0.11	0.46	0.01	-0.06	-0.28	-0.11	-0.46	-0.01
	Longline Catcher/Processor	0	0.39	0.50	0.21	0.59	0	-0.39	-0.50	-0.21	-0.59	0
	Pot Catcher Vessel	0.03	0.94	8.59	4.56	0	0.01	-0.91	-8.56	-4.53	0.03	0.02
	Pot Catcher/Processor	0.01	0	0.95	0.11	0	0.01	0.01	-0.94	-0.10	0.01	0.01
	Trawl Catcher Vessel - S	0.32	2.59	0.89	1.05	5.32	0.13	-2.27	-0.57	-0.73	-5.00	0.19
	Trawl Catcher Vessel - M	0.26	3.07	2.90	1.88	7.13	0.37	-2.82	-2.65	-1.63	-6.88	-0.12
	Trawl Catcher Vessel - L	0.02	0.09	0.07	0.08	0.23	0.01	-0.07	-0.05	-0.06	-0.21	0.01
	Trawl Catcher/Processor - AFA	0	0	0	0.01	0	0	0	0	0	0	0
	Trawl Catcher/Processor - H&G	0.06	0.19	0.24	0.06	0.37	0.07	-0.14	-0.19	-0.01	-0.31	-0.01
Pollock	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Catcher Vessel - Shoreside	0.42	21.00	4.98	6.34	6.34	9.99	-20.58	-4.55	-5.91	-5.91	-9.57
	Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
	Mothership	0	0	0	0	0	0	0	0	0	0	0
Column Total		1.30	30.18	27.93	16.62	21.93	10.70	-28.88	-26.63	-15.32	-20.63	-9.40

Note: Values are reported in millions of dollars.

Table C-58 BSAI closed critical habitat impacts

Species	Fleet	Gross Revenues Placed "at risk" by the Alternative						Difference Between Altermatove 1 Gross and Gross for Listed Alternative (Alt 1 - Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka Mackerel	CDQ	0.06	0.47	1.30	0.17	0.17	0.06	-0.41	-1.24	-0.11	-0.11	0
	Jig	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher/Processor	0.07	5.75	15.66	6.69	6.69	0.07	-5.68	-15.59	-6.62	-6.62	0
Pacific Cod	CDQ	0.05	1.95	5.10	0.41	0.41	0.06	-1.90	-5.05	-0.36	-0.36	-0.01
	Fixed<60	0	0.01	0.09	0.01	0.01	0	-0.01	-0.09	-0.01	-0.01	0
	Jig	0	0.01	0.16	0	0	0	-0.01	-0.16	0	0	0
	Longline Catcher Vessel	0.07	0.02	0.34	0.32	0.32	0.03	0.05	-0.26	-0.25	-0.25	0.05
	Longline Catcher/Processor	0.31	14.41	17.62	4.38	4.38	0.39	-14.10	-17.31	-4.08	-4.08	-0.08
	Pot Catcher Vessel	0.12	0.19	8.62	2.01	2.01	0.21	-0.07	-8.49	-1.89	-1.89	-0.08
	Pot Catcher/Processor	0.07	0.03	2.36	1.04	1.04	0.75	0.04	-2.28	-0.96	-0.96	-0.68
	Trawl Catcher Vessel - S	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher Vessel - M	0.93	14.18	16.60	0.46	0.46	0.70	-13.25	-15.67	0.47	0.47	0.23
	Trawl Catcher Vessel - L	0.36	2.57	1.80	0.32	0.32	0.19	-2.21	-1.44	0.05	0.05	0.18
	Trawl Catcher/Processor - AFA	0.77	0.74	0.19	1.01	1.01	0.27	0.03	0.59	-0.24	-0.24	0.51
	Trawl Catcher/Processor - H&G	1.42	4.23	0.69	1.24	1.24	0.73	-2.81	0.73	0.18	0.18	0.69
Pollock	CDQ	2.68	26.37	5.98	8.48	8.48	3.14	-23.70	-3.30	-5.81	-5.81	-0.47
	Catcher Vessel - Shoreside	3.35	127.31	109.71	16.39	16.39	23.89	-123.96	-106.36	-13.03	-13.03	-20.54
	Catcher/Processor	6.83	51.53	19.48	11.01	11.01	8.21	-44.71	-12.66	-4.18	-4.18	-1.38
	Mothership	2.05	15.34	1.13	2.99	2.99	1.95	-13.29	0.92	-0.94	-0.94	0.10
Column Total		19.14	265.11	206.83	56.93	56.93	40.65	-245.99	-187.66	-37.78	-37.78	-21.48

Note: Values are reported in millions of dollars.

'Open' Critical Habitat Impacts

Tables C-59 and C-60 summarize information on the impacts of the provisions in the alternatives that place limits on harvests in critical habitat areas that remain 'open' to harvest. Table 1.4.2-5 provides the information for fleets operating in the GOA, while Table C-60 provides similar information for fleets operating in the BSAI. Detailed descriptions of the TAC provisions that place these limits on harvests may be found in Section 2.3 of this SEIS.

The format in these tables is like the format in the earlier tables (Tables C-57 and C-58) on 'closed' critical habitat. That is, the two columns on the right identify the target species and the fleet. The next six columns summarize the total gross revenues placed "at risk." The next five columns compare the gross revenues placed "at risk" by Alternatives 2 through 5 with the gross revenues placed "at risk" by Alternative 1. Again, note that these estimates were calculated by subtracting the gross "at risk" from each alternative from the gross "at risk" from Alternative 1. Because Alternatives 2 through 5 tend to place larger amounts of gross revenues "at risk" in 'closed' areas, than Alternative 1, the values in the last five columns of these tables tend to be negative. All of the column totals are negative. All values in these tables are in millions of dollars. Rows at the bottom of the tables provide column sums.

Alternatives 1, 3, and 5 contain the most important 'open' critical habitat limits. Alternative 1 contains 'open' critical habitat limits on Atka mackerel harvests in the Aleutian Islands areas 541 and 542. Alternatives 4 and 4.3 also contain limits on harvests from 'open' critical habitat in the Bering Sea SCA and on Atka mackerel harvests in 541 and 542.

Limits on harvests from 'open' critical habitat are central to Alternatives 1, 3 and 5 and, as shown in tables C-59 and C-60, do appear to impose significant constraints on fishery harvests. In the GOA, these provisions place gross revenues "at risk" to a significant extent under Alternative 3. They place a smaller share of GOA gross revenues "at risk" under Alternative 5.

In the BSAI, the 'open' area harvest limits in Alternatives 3 and 5 place large amounts of gross revenues "at risk." Alternative 3 places about $118 million at risk; most of this, about $82 million, is placed "at risk" for AFA inshore catcher vessels. Alternative 5 places smaller amounts of gross revenue "at risk", than Alternative 3, but the total is still considerable. About $70 million is placed "at risk," with about $44 million placed "at risk" for AFA inshore catcher vessels. Alternatives 1, 4, and 5 place Atka mackerel revenues "at risk."

Table C-59 GOA open critical habitat impacts

Species	Fleet	Gross Revenues Placed “at risk” by the Alternative						Difference Between Alternative 1 Gross and Gross for Listed Alternative (Alt 1-Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka Mackerel	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Jig	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
Pacific Cod	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Fixed<60	0	0	2.99	0	0	0.37	0	-2.99	0	0	-0.37
	Jig	0	0	5.43	0	0	2.44	0	-5.43	0	0	-2.44
	Longline Catcher Vessel	0	0	0.05	0	0	0	0	-0.05	0	0	0
	Longline Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
	Pot Catcher Vessel	0	0	0.90	0	0	0	0	-0.90	0	0	0
	Pot Catcher Processor	0	0	0.03	0	0	0.04	0	-0.03	0	0	-0.04
	Trawl Catcher Vessel - S	0	0	1.34	0	0	0.71	0	-1.34	0	0	-0.71
	Trawl Catcher Vessel - M	0	0	0.28	0	0	0.44	0	-0.28	0	0	-0.44
	Trawl Catcher Vessel - L	0	0	0	0	0	0.01	0	0	0	0	-0.01
	Trawl Catcher/Processor- A FA	0	0	0	0	0	0	0	0	0	0	0
	Trawl-Catcher/processor-H&G	0	0	0	0	0	0	0	0			
Pollock	CDQ	0	0	0	0	0	0	0	0	0	0	0
	Catcher Vessel - Shoreside	0	0	7.29	0	0	0	0	-7.29	0	0	0
	Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
	Mothership	0	0	0	0	0	0	0	0	0	0	0
Column Total		0	0	18.31	0	0	4.01	0	-18.31	0	0	-4.01

Note: Values are reported in millions of dollars.

Table C-60 BSAI open critical habitat impacts

Species	Fleet	Gross Revenues Placed "at risk" by the Alternative						Difference Between Alternative 1 Gross and Gross for Listed Alternative (Alt 1 - Alt X)				
		Alt 1	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5	Alt 2	Alt 3	Alt 4	Alt 4.3	Alt 5
Atka Mackerel	CDQ	0.50	0	0	0.22	0.22	0.60	0.50	0.50	0.28	0.28	-0.10
	Jig	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher/Processor	7.47	0	0	0.85	0.85	6.99	7.47	0	6.62	6.62	0.48
Pacific Cod	CDQ	0	0	0.52	0	0	1.92	0	-0.52	0	0	-1.92
	Fixed<60	0	0	0.02	0	0	0	0	-0.02	0	0	0
	Jig	0	0	0.31	0	0	0.17	0	-0.31	0	0	-0.17
	Longline Catcher Vessel	0	0	0.02	0	0	0	0	-0.02	0	0	0
	Longline Catcher/Processor	0	0	0	0	0	1.73	0	0	0	0	-1.73
	Pot Catcher Vessel	0	0	1.08	0	0	0.40	0	-1.08	0	0	-0.40
	Pot Catcher/Processor	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher Vessel - S	0	0	0	0	0	0	0	0	0	0	0
	Trawl Catcher Vessel - M	0	0	0.98	0	0	9.84	0	-0.98	0	0	-9.84
	Trawl Catcher Vessel - L	0	0	1.42	0	0	2.58	0	-1.42	0	0	-2.58
	Trawl Catcher/Processor - AFA	0	0	0.62	0	0	0.45	0	-0.62	0	0	-0.45
Pollock	Trawl Catcher/Processor - H&G	0	0	2.44	0	0	0.95	0	-2.44	0	0	-0.95
	CDQ	0	0	15.52	0	0	0	0	-15.52	0	0	0
	Catcher Vessel - Shoreside	0	0	81.71	0	0	43.65	0	-81.71	0	0	-43.65
	Catcher/Processor	0	0	5.42	0	0	8.30	0	-5.42	0	0	-8.30
	Mothership	0	0	9.04	0	0	0.37	0	-9.04	0	0	-0.37
Column Total		7.97	0	119.1	1.07	1.07	77.95	7.97	-118.32	6.9	6.9	-70.0

Note: Values are reported in millions of dollars.

1.4.3 Impacts on Dependent Communities

Many of the communities of coastal Alaska, adjacent to the BSAI and GOA, are closely linked to, and highly dependent upon, the commercial groundfish fisheries off Alaska. Fish processing facilities are located in many of these communities, while other (mostly smaller) communities serve as home port for fishing vessels and/or supply crew to the fleet and/or plants. Sixty-five CDQ communities and nine Alaska non-CDQ communities (Unalaska/Dutch Harbor, Sand Point, King Cove, Chignik, Cordova, Seward, Homer, Adak, and Kodiak) are most clearly and directly involved in and dependent upon the BSAI and/or GOA pollock, Pacific cod, and Atka mackerel fisheries. In addition, Seattle, Washington (and the adjacent Puget Sound metropolitan area) has a substantial and direct involvement in these fisheries.

With the exception, obviously, of the Seattle-metro region, there are very few alternative economic opportunities available in these communities. Unemployment is chronically high, well above the national average, and the potential for economic diversification of these largely remote, isolated, local economies is very limited. Indeed, it is this absence of economic opportunity which has historically resulted in a high level of transient, seasonal labor and an unstable population base in many of these towns and villages. Closure of substantial portions of critical habitat to fishing for pollock, Pacific cod, and Atka mackerel, as provided for under virtually all of the proposed SSL Protection Measure alternatives under consideration, could further reduce employment and business opportunities, especially in communities with significant investment in onshore processing capacity and fleet services, further destabilizing these rural coastal communities.

From firms with direct and obvious linkages to the fisheries, such as maritime equipment purveyors, fuel pier operators, cold storage and bulk cargo transhipping firms; to local hotels, restaurants, bars, grocery stores; and commercial air carriers serving these communities, all will be impacted by the proposed structural changes in pollock, Pacific cod, and Atka target fisheries, attributable to the SSL Protection Measure action. While not readily amenable to quantitative estimation at present, over all, many of these (relatively) isolated, rural, fishery-dependent communities will likely experience a significant loss in economic and social welfare, as reflected through a general decline in the 'quality-of-life' for their residents.

Beyond the private sector effects, local government jurisdictions will likely be adversely impacted, as well. Most of these coastal fishing communities rely heavily upon tax revenues associated with "fishing" activities, in all its myriad forms, for operating and capital funds (e.g., fish landings taxes, business and property taxes, sales taxes).

1.4.3.1 Effects on Tax Revenue

Diminished activity in the fisheries translates directly and immediately into reduced revenues to the local governmental jurisdictions, in the current context, at the very time economic and socioeconomic dislocation in the fisheries may increase demands for social services in these rural communities. Taxes, accruing to each Alaska region from fisheries (in this instance, groundfish fisheries), provide an important source of capital and operating revenue for "local" governments.[51] The communities and regions vary in the way that direct revenue is collected on fishery-related transactions that occur within their respective jurisdictions. For communities (and boroughs) in the western Alaska regions, a 'local' fish tax is often a significant source of revenue. For other regions, tax revenue benefits are more closely tied to distributions made from the State of Alaska fish tax. Information is provided below for three major geographic regions (the first two of which would likely be heavily affected by the SSL RPA action, the third likely less so) on shared fishery tax revenues and the role of state shared fish tax in relation to these other taxes.

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[51]Data were drawn from the Alaska Department of Revenue (ADOR), DCED, and local sources.

As suggested, there is considerable variability from region to region, jurisdiction to jurisdiction. Also apparent is the regional differentiation in the importance of the relatively new fishery resource landing tax. This source of revenue comes from the *offshore* sectors of the groundfish fishery and was designed to capture some of the economic benefits of offshore activity for adjacent coastal Alaska regions. Because of the sheer size of the adjacent offshore activity, this source of tax revenues is far more important to the government jurisdictions of the Alaska Peninsula and Aleutian Islands region, than for the other regions listed here.

Alaska Peninsula and Aleutian Islands Region

Commercial fisheries-related taxes are important to this region in absolute and relative terms. Akutan, King Cove, Sand Point, and Unalaska all have local raw fish taxes, and the first three have a borough raw fish landing tax. Fisheries-related shared taxes accounted for 99.7% of all the shared taxes and fees coming to the region from the state in 1999, and total fisheries-related tax revenues exceeded $7 million. The offshore processing component paid more than $2 million in fisheries resource landing tax in 1999. This tax is considerably more important in this region (in both absolute and relative) terms than for any other Alaska region.

Kodiak Island Region

The City of Kodiak and the Kodiak Island Borough are the primary taxing entities in this region. City or community services outside the city are quite limited, or are supplied by the borough or private organization. The borough levies a property tax of 9.25 mils, a 5.0% accommodations tax, and a 0.925% severance tax on natural resources. Other communities within the region levy limited taxes. The region also depends on income from state fisheries taxes. The region’s share of the fisheries business tax and fishery resource landing tax amounted to $1,330,856, in 1999.

Southcentral Alaska Region

None of the southcentral Alaska groundfish processing communities has a local or borough fish tax. At $1,521,569, in fiscal year 1999, 73.3% of the region’s shared taxes and fees were fisheries-related. This is a higher amount than the Kodiak region received (although derived to a lesser extent from groundfish).

1.4.3.2 Other Community Impacts

As populations “adjust” to structural changes of the magnitude associated with the suite of alternatives contained in the proposed SSL Protection Measure management regimes, emigration will likely impose burdens on local social service agencies. For example, school districts depend, for economic support, upon State and Federal revenues based upon per capita enrollment. Because few, if any, viable alternative sources of economic activity exist in most of these rural coastal Alaska communities, the prospects for mitigating these adverse impacts, at least in the foreseeable future, do not appear promising.

Fishing is the economic base in many of these communities. Moreover, these communities are generally very “fragile”, in the sense that they do not have well-developed secondary economic sectors. The cost of doing business in these communities is high and few retail or other firms find it economically advantageous to locate in them. As a result, local residents often have no choice but to spend a large part of their incomes outside the communities. In addition, many who work in the fishing and/or processing sector in these communities are transient laborers who take a large part of their incomes outside of the communities, at the end of the season.

Anything which tends to diminish economic activity in such a setting (e.g., reduction in groundfish fishing activity and associated exports) can do disproportionate damage to an already limited infrastructure in these communities. For example, revenues from transporting groundfish products from plants in these remote communities and villages to market, may generate increased shipping traffic into and out of small rural communities. This traffic might then, in effect, *underwrite* the delivery of other goods and services on "back-hauls", which otherwise could not occur (economically). In addition to the related maritime and stevedoring jobs this activity creates, the ancillary commercial traffic may contribute to a substantial improvement in the material quality of life in many of these towns and villages. However, many of these communities may become vulnerable to loss of transportation service, due to disruptions in these key groundfish fisheries, attributable to SSL Protection associated regulations. While the relationship is likely not perfectly linear, the most significant the structural change associated with the final alternative adopted (e.g., the smaller the available TAC, especially adjacent to these communities; the more temporally dispersed the fishery openings) the greater will likely be the adverse effects on community stability, social welfare, and quality of life.

Even relatively large communities, such as Kodiak, reportedly, expect to see a direct and immediate reduction in maritime transportation services, attributable to the ESA-SSL induced structural changes in these fisheries. Testimony before the Council, at its December 2000 meeting, suggested that, without the transhipment of groundfish products from community plants, it was expected that "in-bound" barge traffic, which supplies fresh food (milk, bread, fruits and vegetables, etc.) and bulk goods to Kodiak would revert to "pre-groundfish fishery" patterns; meaning, just one, rather than two or three barge-calls per week. This will, according to these community sources, produce a direct and measurable decline in the quality of life in the community. As one resident of Kodiak put it, "*We'll be back to the days when, from time to time, there was simply no milk to be had in town. One might have to wait several days before the next barge arrived and stores could be re-stocked*."

Communities which support and depend upon these commercial fisheries will likely incur substantial adverse economic, socioeconomic, and cultural impacts as they adjust to changes in the timing and total magnitude of fishery related activities, associated with newly imposed requirements of the SSL Protection management regime (as those reflected among the suite of proposed alternatives to the status quo). Because much of the economic infrastructure of rural Alaska coastal communities has developed in support of commercial fishing (especially, most recently, that of groundfish) secondary (adverse) effects on businesses which supply goods and services to the fleet will also be widespread.

1.4.3.3 Regional Fishery Dependence Profiles

The following section provides an overview of the "relative value" of the species landed in fishing communities in the Bering Sea, Aleutian Islands, and Gulf of Alaska. Note that these estimates include only fish delivered to inshore processors for 'processing' (i.e., ex-vessel), but do not reflect deliveries of processed fish products to these ports from catcher/processors or motherships. Due to confidentiality restrictions, processor information cannot be reported unless there are data from three or more processing companies in the 'category' (e.g., community) being treated.

To maintain confidentiality, the community information presented in the following section has been combined and presented in three aggregate groupings, as follows:

1) Unalaska/Dutch Harbor
2) Kodiak
3) "Other" communities, including: Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward

The ex-vessel value of fish landed at each of these ports (or port groupings) was calculated using data from the State of Alaska fish ticket files, as well as license files from the Commercial Fisheries Entry Commission, for various years. Ex-vessel value, which is a catcher vessel operator's gross revenue, was calculated using the number of round pounds landed with each fish ticket delivery, matched with the estimated ex-vessel value for that species, area, and year, from Commercial Fisheries Entry Commission data files.

The proportional share then represents the "ex-vessel value of landings" from each of the following species/species groups: pollock, Pacific cod, Atka mackerel, other groundfish, salmon, halibut, crab, herring, and "other". The analysis was completed for 1999, since that is the most recent year for which fish ticket files that include revenues from halibut, are available. Data for the years 1993 through 2000 were examined to investigate trends or changes in the relative contribution from the various species.

Figure 1.1 shows the respective ex-vessel value for fish landed at Unalaska in 1999. As noted in the figure, crab provided the largest overall contribution to ex-vessel value, accounting for 49% of the total. Pollock landings accounted for 36% of the total, while Pacific cod accounted for 5.0%. Atka mackerel provided a 'zero' contribution to the value of fish landed at Unalaska,, in 1999. The ex-vessel value of all species landed at Unalaska in 1999 totaled approximately $176 million.

Pollock contributed a large share of the ex-vessel value of fish landed at Unalaska during the period from 1993 through 2000, varying from a low of 34.5%, in 1993, to a high of 57.4%, in 2000. The change in relative importance of pollock in 2000 was due to the combined effect of high ex-vessel values for landings of pollock and low ex-vessel values for landings of crab.

Pacific cod landings at Unalaska account for an important share of total ex-vessel value, although the proportional share is much smaller than for pollock. During the period from 1993 through 2000, the relative share of total ex-vessel landings of Pacific cod varied from a low of just under 3.6%, in 1993, to a high of 11.7%, in 1996. In 2000, Pacific cod accounted for 6.6% of the total ex-vessel fish value landed at Unalaska.

Atka mackerel contributed a consistent 'zero' percent of the total ex-vessel value for landings of fish at Unalaska for the period from 1993 through 2000. As noted elsewhere in this report, Atka mackerel are only occasionally landed at shore plants, typically only as bycatch, with a very low value.

Other groundfish, including all groundfish landed at Unalaska except pollock, Pacific cod and Atka mackerel, accounted for a very small share of total ex-vessel value for the years 1993 through 2000. The range for other groundfish ranged from 1.09%, in 1999, to a high of 3.69%, in 1997.

The ex-value of crab landed at Unalaska accounted for a consistently large proportion of the total for the period from 1993 through 2000. The proportional share varied from a low of 30.9%, in 2000, to a high of 53%, in 1998. The ex-vessel value of crab landed at Unalaska in 2000 was much lower than in other years during the 1993 through 2000 period. This change was primarily due to the low harvests of C. opilio tanner crab in 2000.

Salmon accounts for a relatively minor share of the total ex-vessel value of fish landed at Unalaska. During the period from 1993 through 2000, the relative share from salmon varied from a low of 2.27%, in 1997, to a high of 7.9%, in 1994. Unalaska fish processors receive salmon deliveries from the local 'Area M' salmon fishery, but most of the salmon processed in Unalaska comes from Bristol Bay and occasionally other areas.

Halibut also accounts for a relatively minor share of the total ex-vessel value of fish landed at Unalaska. For the period from 1993 to 1999 (as noted above, the 2000 values for halibut are not yet available), the relative share from halibut landings in Unalaska varied from a low of 1.91%, in 1998, to a high of 6.24%, in 1997. Herring and other species account for a very minor share of the total ex-vessel value of fish landed at Unalaska.

For the period from 1993 through 2000, the total ex-vessel value for fish landed at Unalaska varied from a low of $120.9 million, in 1998, to a high of $176.0, in 1999. Not including halibut, the ex-vessel value for all fish landed at Unalaska in 2000 totaled $138.8 million.

Figure 1.2 shows the respective ex-vessel value for fish landed at Kodiak. As shown in that figure, salmon provided the largest overall contribution to ex-vessel value, with 29% of the total. Pacific cod landings accounted for 26% of the total. Pollock accounted for roughly 13% of total ex-vessel value, while Atka mackerel provided a 'zero' contribution to the aggregate value of fish landed at Kodiak, in 1999. The value for all species landed at Kodiak in 1999, totaled approximately $96 million.

During the period from 1993 through 2000, pollock accounted for an important component of total ex-vessel fish value at Kodiak. The contribution from pollock ranged from a low of 5.84%, in 1996, to a high of 18.2%, in 2000. There were only two years during this period (1995 and 1996) where the respective contribution from pollock was less than 10%. The high proportional share in 2000 was caused by a low value for salmon landings that year, as well as the omission of halibut landed values.

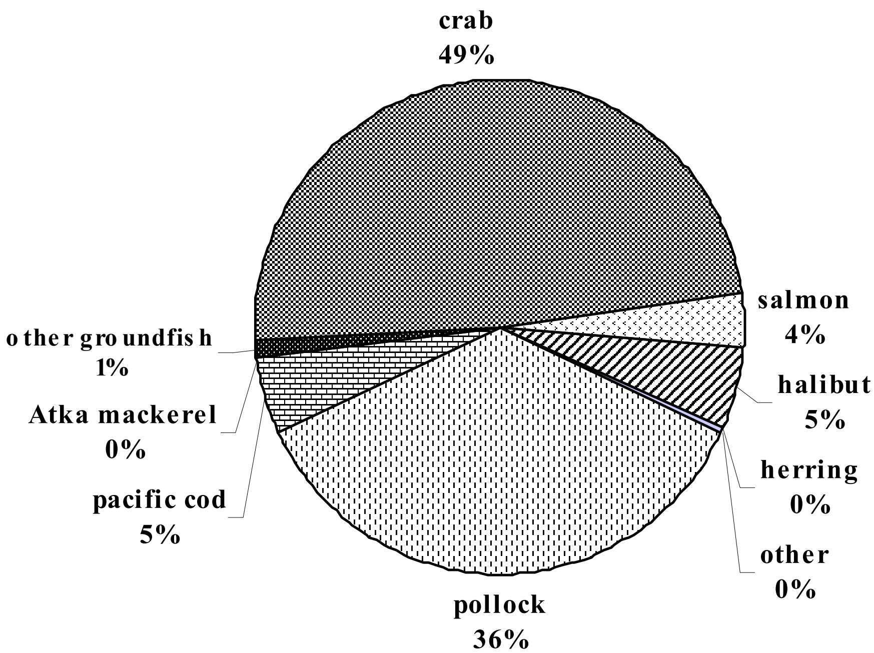
Pacific cod was a very important species in Kodiak during the period from 1993 through 2000. Pacific cod's proportional contribution to total ex-vessel value for fish landed varied during this period from a low of 8.5%, in 1994, to a high of 27.3%, in 2000. There was a steady upward trend in the proportional contribution of Pacific cod at Kodiak over this period. Atka mackerel provided a 'zero' percent share of total ex-vessel landed value, at Kodiak ,for the years 1993 through 2000. The only recorded value for Atka mackerel appears to be a very small amount of bycatch. Other groundfish, including all groundfish landed at Kodiak, except pollock, Pacific cod and Atka mackerel, accounted for a similar proportion of total ex-vessel landed value. The percentage share for other groundfish varied, from a low of 8.23%, in 1999, to a high of 19.05%, in 1996.

Crab contributed a relatively modest share of total ex-vessel landed value for Kodiak fisheries during the period from 1993 through 2000. The proportional contribution from crab varied from a low of 2.37%, in 1998, to a high of 10.52%, in 1993. In 2000, crab accounted for 10.44% of total ex-vessel landed value, again noting that halibut landings are not included for that year. When Kodiak's 2000 halibut landings are added in, the respective share from crab will diminish.

Salmon provides the largest share of the total ex-vessel landed value in Kodiak. For the period from 1993 through 2000, the proportional share from salmon varied from a low of 20.7%, in 1997, to a high of 43.6%, in 1995. In 2000, salmon accounted for 27.4% of total ex-vessel landed value at Kodiak. Halibut is also an important species. During the 1993 through 1999 period, halibut accounted for 14.27% (1995) to 27.62% (1997) of total ex-vessel landed value. Herring and other species account for a small share of total ex-vessel landed value in Kodiak. Herring accounted for a share of total ex-vessel value ranging from less than one percent to 6.14%, in 1996. The contribution to total ex-vessel landed value from other species was less than one percent.

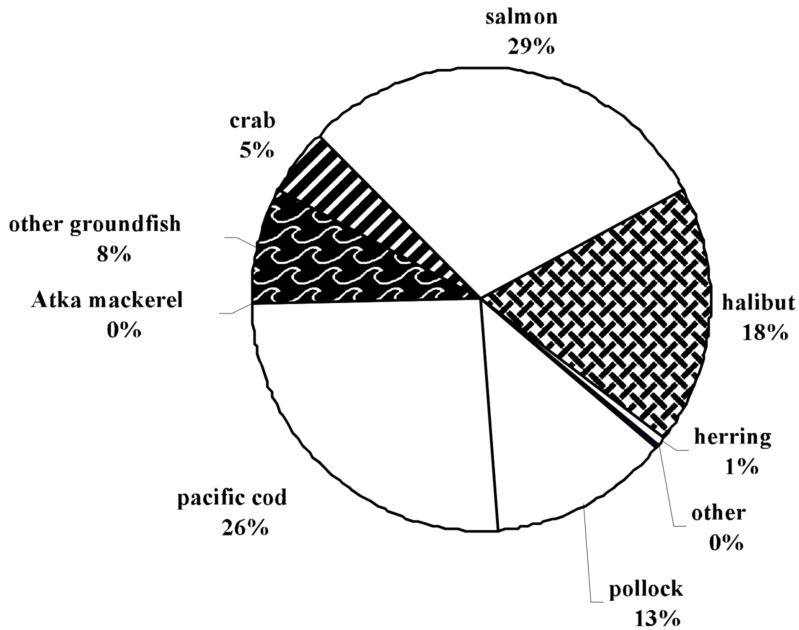
From 1993 through 2000, the total ex-vessel value for fish landed at Kodiak ranged from $67.3 million, in 2000, to a high of 94.9 million, in 1995. When halibut values are included for 2000, the total ex-vessel landed value for that year will be increased by a considerable (but, presently unknown) amount. The 1993 to 1999 value for landings of halibut in Kodiak ranged from $10 million to $22 million, so it is likely that the ex-vessel value for 2000 will account for a similar amount.

Figure C-3 Relative value of various species landed at unalaska in 1999



Source: data files provided by the North Pacific Fishery Management Council

Figure C-4 Relative value of various species landed at Kodiak in 1999



Source: data files provided by the North Pacific Fishery Management Council

Figure C-5 shows the respective ex-vessel value for fish landed at the third grouping of communities (i.e., Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward). As noted, while reflecting a very dissimilar and diverse group of processors and plants, confidentiality constraints make this aggregation necessary.

Salmon provides the largest overall contribution to ex-vessel value for these communities, with 37% of the total. Pollock landings accounted for 15% of total ex-vessel value, while Pacific cod landings accounted for 12%. Atka mackerel provided a 'zero' contribution to the value of fish landed at these communities, in 1999. The value for all species landed in the group of other communities, in 1999, totaled $223 million.

During the period from 1993 through 2000, pollock accounted for an important component of total ex-vessel fish value for the community grouping of Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward. The contribution represented by pollock ranged from a low of 9.27%, in 1993, to a high of 30%, in 2000. Pacific cod is also an important species to this categorical grouping. During the period from 1993 through 2000, the contribution to aggregate total ex-vessel landed value, from Pacific cod, ranged from a low of 6.55%, in 1993, to a high of 14.03%, in 1997. The proportional share of total ex-vessel landed value from Pacific cod, in 2000, was 10.66%. As was the case in Unalaska and Kodiak, there was effectively a 'zero' percent contribution from Atka mackerel for this community grouping.

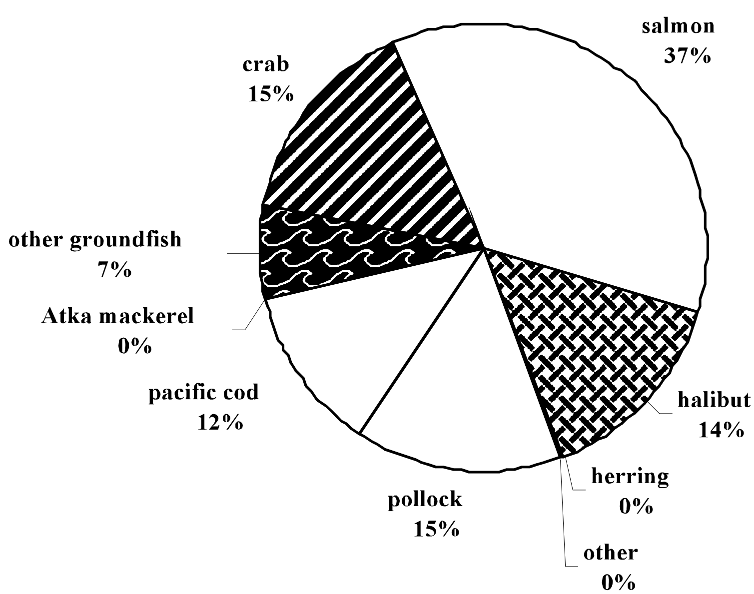
Other groundfish, including all groundfish landed at this group of communities except pollock, Pacific cod and Atka mackerel, accounted for an important proportion of total ex-vessel landed value. The percentage share for other groundfish varied from a low of 6.52%, in 1999, to a high of 14.35%, in 1995.

Crab also contributed an important share of total ex-vessel landed value for the community grouping of Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward during the period from 1993 through 2000. The range for the proportional contribution from crab varied from a low of 9.92%, in 1997, to a high of 24.47%, in 1993. In 2000, crab accounted for 14.95% of total ex-vessel landed value, noting that halibut landings are not included for that year.

Salmon provides the largest share of the total ex-vessel landed value for the community grouping of Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward during the period from 1993 through 2000. The proportional share from salmon varied from a low of 30.41%, in 1997, to a high of 42.03%, in 1993. In 2000, salmon accounted for 31.27% of total ex-vessel landed value at the respective communities in this group.

Halibut is an important species for this group of communities. During the 1993 through 1999 period, halibut accounted for 6.66% (1995) to 14.28% (1999) of total ex-vessel landed value. Herring and other species accounted for a small share of total ex-vessel landed value for this group of communities.
From 1993 through 2000, the total ex-vessel value for fish landed at the community group comprised of Adak, Akutan, Chignik, Cordova, Homer, King Cove, Sand Point, and Seward ranged from $132.8 million, in 1998, to a high of 223.5 million, in 1999. When halibut values are included for 2000, the total ex-vessel landed value for these communities will be increased substantially.

Figure C-5: Relative value of various species landed at other communities in 1999



Source: data files provided by the North Pacific Fishery Management Council

1.4.3.4 Impacts on Community Development Quota Groups and Communities

The Western Alaska Community Development Quota (CDQ) Program was created by the North Pacific Fishery Management Council (Council) in 1992, in connection with the inshore/offshore allocation of pollock in the Bering Sea and Aleutian Islands. The purpose of the CDQ Program was to help western Alaska communities to diversify their local economies and to provide new opportunities for stable, long-term employment.

Currently, 65 communities are eligible to participate in the CDQ Program. The CDQ communities are located within 50 nautical miles of the Bering Sea coast or on an island in the Bering Sea. Approximately 27,000 people live in the CDQ communities, which are small communities populated predominantly by Alaska Native people (Table 2.5-5 of this SEIS lists the 65 CDQ communities). These 65 communities have formed the following six non-profit corporations, called "CDQ groups", to manage and administer their CDQ allocations, investments, and economic development projects:

Aleutian Pribilof Island Community Development Association (APICDA)
Bristol Bay Economic Development Corporation (BBEDC)
Central Bering Sea Fishermen's Association (CBSFA)
Coastal Villages Region Fund (CVRF)
Norton Sound Economic Development Corporation (NSEDC)
Yukon Delta Fisheries Development Association (YDFDA)

Through the CDQ Program, a portion of the Bering Sea and Aleutian Islands area (BSAI) TACs for crab, halibut, groundfish, and prohibited species are allocated to eligible western Alaska communities. The percentage of each catch limit allocated to the CDQ Program is determined by the American Fisheries Act (AFA) for pollock (10%), the Magnuson-Stevens Act for crab (7.5%), the Fishery Management Plan for the Groundfish Fisheries of the Bering Sea and Aleutian Islands area (FMP) for all other groundfish and prohibited species (7.5%, except 20% for fixed gear sablefish), and 50 CFR 679 for halibut (20% to 100%). These allocations to the CDQ Program are called "CDQ reserves." Table 2.5-6 of this SEIS summarizes the 2001 CDQ reserves.

With the addition of the remainder of the groundfish species and the prohibited species allocations in 1998, NMFS implemented regulations combining the two separate CDQ fisheries (pollock and fixed gear halibut and sablefish) with the new groundfish and prohibited species into the multispecies groundfish and halibut CDQ fisheries. The CDQ groups are required to manage their catch to stay within all of their CDQ allocations. NMFS implemented this system of strict quota accountability because the Council recommended that all bycatch in all of the CDQ fisheries should accrue against the CDQ allocations and none of this catch should be subtracted from the portion of the quotas available to the non-CDQ fisheries.[52]

In 2000, approximately 180,000 metric tons of groundfish, 3 million pounds of halibut, and 3 million pounds of crab were allocated to the CDQ Program. The primary source of income for the CDQ groups is royalties from leasing their CDQ allocations. In 2000, the six CDQ groups earned $63 million in total revenues, of which about $40 million (63 percent) was from royalties. The remaining 37 percent of revenues was from income from partnerships, interest income, sale of property, leases, loan repayment, and other income.

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[52]The allocation of squid to the CDQ Program was removed in 1999 under an emergency rule and permanently in 2001, so that the bycatch of squid in the pollock CDQ fisheries would not prevent the CDQ groups from fully harvesting their pollock CDQ allocations.

Pollock is the most valuable species to the CDQ groups, contributing about $33 million in royalties in 2000 (83 percent of royalties). Since 1992, the six CDQ groups have accumulated assets worth approximately $187 million, including ownership of small local processing plants, catcher vessels, and catcher/processors that participate in the groundfish, crab, salmon, and halibut fisheries. The CDQ groups have used their CDQ allocations to develop local fisheries, invest in a wide range of fishing businesses outside the communities, and provide residents with education, training, and job opportunities in the fishing industry (State of Alaska, 2001).

In terms of the pollock, Pacific cod, and Atka mackerel fisheries, the CDQ groups lease quota both to vessels they own and to independent vessels. If CDQ is leased to vessels owned by the CDQ group, they receive both royalties from lease of the quota, as well as a share of any profits (or loss) made by the vessel. If CDQ is leased to independent vessels, the CDQ group receives just the royalties. All of the CDQ groups own a share of catcher/processors or a mothership that participate in the pollock fisheries, and most of their pollock allocations are harvested by these partners. Four of the six groups own a share of longline catcher/processors that participate in the BSAI Pacific cod fisheries. These vessels harvest all of the groups' Pacific cod CDQ, except an amount reserved by the groups as incidental catch in other CDQ fisheries. None of the CDQ groups have purchased vessels that participate in the Atka mackerel fisheries, so all of the Atka mackerel CDQ is leased to vessels that are independent of the CDQ groups. In addition to royalties and profit sharing, the CDQ groups also employ community residents on vessels, in processing plants, and in the offices of the vessels and processors they partner with. Table C-61 lists the vessels and processors owned by CDQ groups that participate in the pollock or Pacific cod fisheries.

Any management measure that decreases the value of the pollock, Pacific cod, or Atka mackerel fisheries in general, also will negatively affect the CDQ groups through reduced royalties, reduced profit-sharing, or increased costs. Individual community residents who already work for CDQ industry partners may be negatively affected if they earn less, because the value of a fishery decreases, or they work fewer days because quotas have decreased. Future workers from CDQ communities may be negatively impacted if fewer jobs are available in the fishing industry.

One of the reasons that the CDQ allocations are valuable is because these quotas are available to fish during times when the non-CDQ fisheries are closed. In addition, the CDQ allocations are not harvested on a competitive basis, as are many of the non-CDQ fisheries. These allocations are made to a specific

Table C-61. Community Development Quota groups' investments in vessels or processors that participate in the pollock or Pacific cod fisheries off Alaska.

CDQ Group	Vessel or Processor Name	Fishery	Percent CDQ Owns
APICDA	Bering Pacific Seafoods in False Pass	Pacific cod	100%
APICDA	Bering Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Ocean Prowler, longline catcher/processor	Pacific cod	25%
APICDA	Golden Dawn, trawl and pot catcher vessel	Pollock, crab	25%
APICDQ	Starbound, trawl catcher/processor	Pollock	20%
BBEDC	Bristol Leader, longline catcher/processor	Pacific cod	50%
BBEDC	Neahkanie, trawl catcher vessel	Pollock	20%
BBEDC	Arctic Fjord, trawl catcher/processor	Pollock	20%
CBSFA	American Seafoods, 7 trawl catcher/processors	Pollock, cod, flatfish	3.47%
CVRF	Ocean Prowler, longline catcher/processor	Pacific cod	20%
CVRF	American Seafoods, 7 trawl catcher/processors	Pollock, cod, flatfish	22.6667%
NSEDC	Glacier Fish Company, 2 trawl catcher/processors, 1 longline catcher/processor, salt cod processing facility	Pollock, cod, halibut, sablefish	50%
YDFDA	Golden Alaska, mothership	Pollock	19.8%
YDFDA	Alakanuk Beauty, trawl catcher vessel	Pollock	75%
YDFDA	Emmonak Leader, trawl catcher vessel	Pollock	75%
YDFDA	Lisa Marie, multi-gear catcher vessel	Pacific cod, halibut	100%

CDQ group and, within some very limited seasonal restrictions, the CDQ group decides when and how to harvest its quota. Because the CDQ allocations are reserved for a particular CDQ group and may be harvested during times when the non-CDQ fisheries are closed, the industry partners do not want to harvest CDQ while they have an opportunity to harvest fish in a non-CDQ fishery. Therefore, with the exception of the AFA pollock fisheries, CDQ harvests occur outside of the time of the directed fisheries. The pollock AFA fisheries operate under a cooperative structure and, in recent years, the CDQ and AFA allocations have been harvested at almost the same time, with vessels sometimes alternating between CDQ and AFA hauls in the same day. Pacific cod CDQ is harvested almost exclusively by longline catcher/processors during in the late spring and summer and again after the non-CDQ fisheries close in the late fall or winter. The Atka mackerel CDQ allocations generally are harvested by one or two trawl catcher/processors in the late spring and early summer.

1.4.3.4.1 CDQ Allocations Under the Alternatives

Table C-62 summarizes the allocations to the CDQ Program under each of the alternatives. Section 2.5 of this SEIS contains a more detailed explanation of how the TAC limits and CDQ reserves are calculated under each alternative. Under Alternative 2 and Alternative 3, the many subdivisions of the TACs result in some relatively small CDQ reserves. For example, under Alternative 2, the Pacific cod CDQ reserve in the Aleutian Islands would be about 100 mt and Atka mackerel CDQ reserves in the Bering Sea/Eastern Aleutian Islands would be 89 mt per season. Under Alternative 3, some of the inside critical habitat area catch limits for the CDQ fisheries are very small (e.g., 21 mt for Aleutian Islands pollock).

Each of the CDQ reserves shown in Table C-62 would be further allocated among the six CDQ groups using the percentage allocations shown in Table C-63 (allocations for 2001 and 2002). Application of these percentage allocations would result in some very small CDQ allocations to individual groups, particularly under Alternatives 2 and 3. Some of these quota amounts are less than could be harvested in a single trawl haul. Very small annual CDQ allocations to individual groups are of concern because it would be difficult for the CDQ groups to manage their catch within their allocations. The groups would have to decide whether to forego harvest of CDQ in the area or risk an overage, which is a violation of NMFS regulations and subject to penalties.

Alternative 2 would divide the BSAI Pacific cod TAC into five area TACs, as described in Section 2.3. Once the Pacific cod CDQ reserve is allocated among the groups, individual groups would receive CDQ allocations for the Central Aleutian Islands of between 10 mt and 20 mt for the year. The largest Pacific cod CDQ allocations would occur in the east of 170˚ west longitude area, and would range from 200 mt to 300 mt per CDQ group for the year. In contrast, the 2001 BSAI Pacific cod CDQ allocations to individual groups range from 1,400 mt to about 2,600 mt and can be fished in any open area of the BSAI at any time during the year. The Atka mackerel CDQ allocations to individual groups in the Bering Sea and Eastern Aleutian Islands also would be quite small, ranging from seven metric tons to 27 mt. The 2001 Atka mackerel allocations in this area range from 47 mt to 100 mt per CDQ group.

Under Alternative 3, some of the seasonal inside critical habitat area catch limits to individual CDQ groups also would be quite small. The A season inside critical habitat allocation of pollock would range from 1 mt to 5 mt. Other critical habitat area catch limits for Pacific cod and Atka mackerel also would be less than 20 mt for each of the CDQ groups (e.g. AI C season Pacific cod and BS/EAI A season Atka mackerel).

Table C-62 Estimated amount of pollock, Pacific cod, and Atka mackerel allocations to the CDQ program under each alternative

Alternative 1					
	A	**B**	**Total**		
Seasons	1/20-4/15	9/1-11/1			
BS Pollock	63,000	77,000	140,000		
AI Pollock	2,380		2,380		
BSAI Pacific Cod	na	na	14,100		
BS/EAI Atka Mackerel	na	na	585		
CAI Atka Mackerel	na	na	2,520		
Inside CH	na	na	1,008		
WAI Atka Mackerel	na	na	2,093		
Inside CH	na	na	837		
Alternative 2					
	A	**B**	**C**	**D**	**Total**
	1/20-3/15	4/1-6/1	6/15-8/15	9/1-12/31	
Bering Sea Pollock					
East of 170 W	17,840	15,438	13,380	13,380	60,038
West of 170 W	16,467	18,869	20,927	20,927	
AI Pollock	No Directed Fishing of Pollock in the Aleutian Islands				
Pacific Cod					
East of 170 W	2,079	1,293	1,293	1,597	6,262
West of 170 W	456	1,242	1,242	938	3,878
EAI (541)	128	128	128	128	10,140
CAI (542)	100	100	100	100	401
WAI (543)	118	118	118	118	471
BS/EAI Atka Mackerel	89	89	89	89	356
CAI Atka Mackerel	384	384	384	384	1,536
WAI Atka Mackerel	319	319	319	319	1,276
Alternative 3					
	A	**B**	**C**	**D**	**Total**
Season	1/20-4/1	4/1-6/10	6/10-8/21	8/21-11/1	
Bering Sea Pollock	56,000		84,000		140,000
Limit Inside Area 7	10,220	6,440	1,260	1,960	19,880
Aleutian Islands Pollock	952		1,428		2,380
Limit Inside CH-RFRPA	21	24	43	40	128
BS Pacific Cod	4,963		7,445		12,408
Limit Inside CH-RFRPA	856	161	310	744	2,071
AI Pacific Cod	677		1,015		1,692
Limit Inside CH-RFRPA	232	125	74	164	595
BS/EAI Atka Mackerel	234		351		585
Limit Inside CH-RFRPA	88	88	130	130	436
CAI Atka Mackerel	1,008		1,512		2,520
WAI Atka Mackerel	837		1,256		2,093

Table C-62 Estimated amount of pollock, Pacific cod, and Atka mackerel allocations to the CDQ program under each alternative (Cont.)

Alternative 4					
	A	**B**	**Total**		
Bering Sea Pollock					
Season	1/20-6/10	6/10-11/1			
Seasonal Allocation	56,000	84,000	140,000		
Inside SCA	42,000		42,000		
Aleutian Islands Pollock			2,380		
BSAI Pacific Cod					
Seasons (Longline)	**1/1-6/10**	**6/10-12/31**			
Seasons (Pot)			**1/1 - 12/31**		
Seasons (Trawl)					
Seasonal Allocation	8,460	5,640	14,100		
BSAI Atka Mackerel seasons	**1/20-4/15**	**9/1-11/1**			
BS/EAI Atka Mackerel	293	293	586		
CAI Atka Mackerel	1,260	1,260	2,520		
Inside CH	882	882	1,764		
WAI Atka Mackerel	1,046	1,046	2,092		
Inside CH	732	732	1,464		
Alternative 5					
	A	**B**	**C**	**D**	**Total**
Seasons	1/20-4/1	4/1-6/10	6/10-8/20	8/20-11/1	
Bering Sea Pollock	56,000		84,000		140,000
Limit Inside SCA	34,720	11,480	11,760	19,320	77,280
Aleutian Islands Pollock	No Directed Fishing for Pollock				
	A	**B**			
Pacific Cod					
Seasons	1/20-5/1	5/1-11/1	Total		
BS Seasonal Allocation	4,963	7,445	12,408		
BS Limit Inside CH-RFRPA	2,482	447	2,929		
AI Seasonal Allocation	677	1,015	1,692		
AI Limit Inside CH-RFRPA	338	817	1,155		
BS/EAI Atka mackerel	na	na	585		
CAI Atka mackerel	na	na	2,520		
Inside CH	na	na	1,008		
WAI Atka mackerel	na	na	2,093		
Inside CH	na	na	837		

Notes:
BSAI = Bering Sea and Aleutian Islands Area
BS = Bering Sea
AI = Aleutian Islands
EAI = Eastern Aleutian Islands (541)
CAI = Central Aleutian Islands (542)
WAI = Western Aleutian Islands (543)
CH = Steller sea lion critical habitat
SCA = Steller sea lion conservation area
CH-RFRPA = Steller sea lion critical habitat under the Revised Final Reasonable and Prudent Alternative in NMFS's 2000 Biological Opinion

Table C-63 Percentage Allocations of Pollock, Pacific Cod, and Atka Mackerel to the CDQ Groups in 2001.

	Percentage Allocations to Each CDQ Group in 2001		
CDQ Group	**Pollock**	**Pacific Cod**	**Atka Mackerel**
APICDA	14	16	30
BBEDC	21	20	15
CBSFA	4	10	8
CVRF	24	17	15
NSEDC	23	18	14
YDFDA	14	19	18

Source: State of Alaska, Department of Community and Economic Development. Western Alaska Community Development Quota Handbook. Published by the Division of Community and Business Development, CDQ Program Office, Juneau, Alaska. June, 2001. 228 p.

Overall, Alternatives 2 and 3 appear to be the most costly to the CDQ groups because they create so many smaller quota categories. These small quotas would be difficult for the CDQ groups to manage, may result in foregone catch, and may generate lower royalties because they will be more costly to harvest and they represent very little additional fishing time for potential partners.

1.4.3.4.2 Seasonal Allocations of Atka Mackerel and Pacific Cod Under Alternative 4

Although not specifically stated in the description of Alternative 4 in the SEIS, it was assumed that the seasons and seasonal allocations of Atka mackerel and Pacific cod would apply to the CDQ fisheries. Seasonal allocations have applied to the pollock CDQ reserve since implementation of the pollock CDQ Program in 1992. However, the seasonal allocations for Steller sea lion protection that have been in effect since 1999 for Atka mackerel and 2001 for Pacific cod have not applied to the CDQ reserves for these species. The proposed rule for Steller sea lion protection measures in the Atka mackerel fisheries (63 FR 60288; November 9, 1998) states that the reason the seasonal allocation was not applied to the CDQ reserve was because "jig gear and CDQ fishing occur outside the time period of the open access trawl fishery, and ...are too small, widely dispersed, and slowly paced to lead to localized depletions of Atka mackerel." Rulemaking implementing the seasonal allocation of Pacific cod in 2001 did not specifically address why the seasonal allocation did not apply to the CDQ reserve for Pacific cod (66 FR 7276; January 22, 2001).

Atka Mackerel: Alternative 4 would apply the seasonal allocation of Atka mackerel to the CDQ fisheries. The Atka mackerel CDQ allocation to each group would be allocated 50 percent to the "A" season (January 20 through April 15) and 50 percent to the "B" season (September 1 through November 1), and would prohibit directed fishing for Atka mackerel by the CDQ groups between April 15 to September 1. This alternative would significantly reduce the time available for the CDQ groups to harvest their Atka mackerel allocations as compared to the 1999 through 2001 CDQ fisheries. Table C-64 summarizes the seasonal distribution of Atka mackerel catch in the 1999 through 2001 CDQ fisheries (2001 data is through 9/16/01). Figure C-6 shows the timing of Pacific cod catch by the CDQ and non-CDQ fisheries by week in 2000.

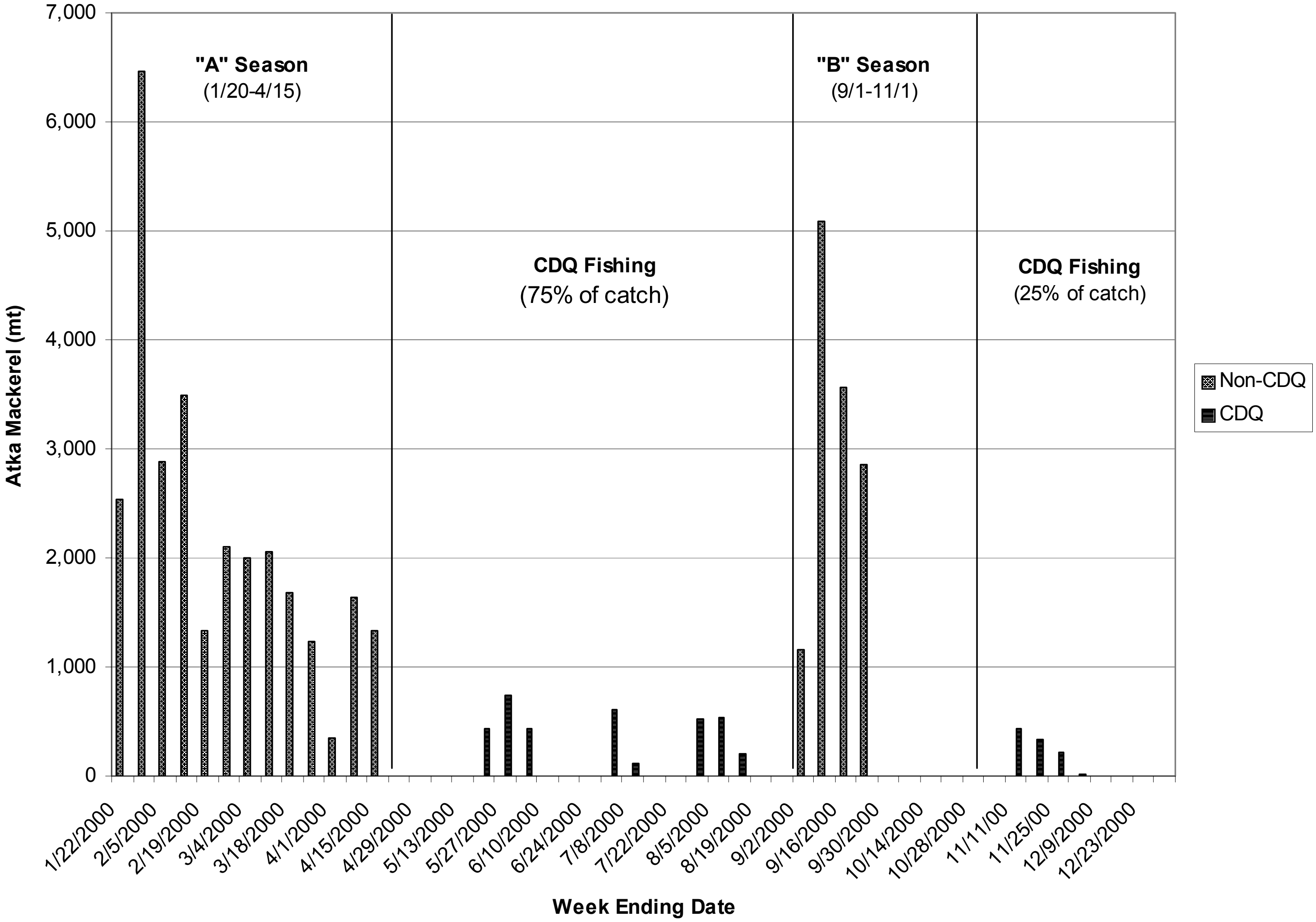
The CDQ groups caught almost zero Atka mackerel between January 1 and April 15, because these are the times that their partner vessels are participating in open access Atka mackerel, flatfish, and cod fisheries. In 1999, the CDQ groups caught 78 percent of their annual Atka mackerel catch between April 15 and September 1 and in 2000, they caught 75 percent of the Atka mackerel in this period. They caught 12 percent (in 1999) and 0 percent (2000) of their Atka mackerel during the "B" season (September 1 through November 1). The groups caught the remainder of their Atka mackerel between November 1 and December 31 (9 percent in 1999 and 25 percent in 2000).

Table C-64. Catch of Atka mackerel in the CDQ fisheries by season, 1999, 2000, and 2001 through September 16, 2001

Season and Annual Totals	**1999**	**2000**	**2001**
1/20 - 4/15 Catch (% of total)	0	12 (0.25%)	0
4/15 - 9/1 Catch (% of total)	2,026 (78%)	3,596 (75%)	3,466
9/1 - 11/1 Catch (% of total)	317 (12%)	0	182 (thru 9/16/01)
11/1 - 12/31 Catch (% of total)	244 (9%)	1,179 (25%)	
Annual total catch	2,588 (100%)	4,787 (100%)	3,648 (thru 9/16/01)
Annual allocation	4,980	5,309	5,198
% of annual allocation harvested	52%	90%	70% (9/16/01)

(values in metric tons and percentages of total annual catch).

Figure C-6 Catch of Atka Mackerel in the BSAI Trawl Fisheries in 2000 CDQ vs Non-CDQ by Week



Pacific cod:

Alternatives 4 is assumed to apply seasons and seasonal allocations to the Pacific cod CDQ allocations. However, it is not clear in the current description of Alternative 4 what seasons and seasonal allocations should apply to the CDQ fisheries. Alternative 4 proposes different seasons and allocations for various gear and vessel types, including trawl catcher vessels, trawl catcher/processors, longline and jig gear, and pot gear. This makes sense for the non-CDQ fisheries, because the Pacific cod TAC is allocated among these gear and vessel types. However, the CDQ reserve is not allocated among gear types. Although the CDQ groups have historically used longline catcher/processors to harvest their Pacific cod allocations, they are not required to do so, and they may decide to use other gear types in the future. The only specific reference to the CDQ fisheries in Alternative 4's Pacific cod seasons, was that "pot CDQ" has a season from January 1 through December 31.

NMFS is assuming that, if the Council desires to apply seasonal allocations to the Pacific cod CDQ reserve, it would be appropriate to use the seasons and seasonal allocations that apply to vessels using longline gear. This would allow vessels using longline, pot, and jig gear to fish at any time from January 1 through December 31, but would allocate the cod CDQ reserve 60 percent to January 1 through June 10 and 40 percent from June 10 through December 31. The CDQ groups would be prohibited from using trawl gear to directed fish for Pacific cod before January 20 and after November 1.

The seasonal allocation would prohibit the CDQ groups from catching more than 60 percent of their Pacific cod allocations before June 10. However, "roll-over" provisions for the seasonal allocations would allow the CDQ groups to catch less than 60 percent in the A season and carry forward any remaining quota to be harvested during the B season. Therefore, Alternative 4 would have a negative impact on the CDQ fisheries if they wished to catch more than 60 percent of their Pacific cod allocations prior to June 10.

Table C-65 summarizes the seasonal distribution of Pacific cod catch in the 1999 through 2001 CDQ fisheries (2001 data is through 9/16/01). Figure C-7 shows the distribution of the Pacific cod catch in the CDQ and non-CDQ fisheries by week in 2000. I

In 1999, the CDQ groups caught about 40 percent of their Pacific cod allocation between January 1 and June 10 and the remaining 60 percent after June 10. In 1999, the non-CDQ fisheries were open between January 1 and April 17; between September 15 and October 19, and again between December 6 and December 31. The last December opening was as a result of reallocating unused Pacific cod from the trawl to non-trawl sector. This type of reallocation often occurs because vessels using trawl gear cannot fully harvest their cod allocations. When this occurs, it makes the non-CDQ longline fishing season longer, thereby reducing the available days to harvest CDQ Pacific cod.

In 2000, the CDQ groups harvest about 60 percent of their Pacific cod allocations between January 1 and June 10 and 40 percent between June 10 and December 31 (see also Figure C-X2). The non-CDQ longline cod fishery was open between January 1 and March 10, and closed about five weeks earlier than in 1999, providing more time for CDQ fishing in the spring of 2000. CDQ fishing continued through the summer right up until the opening of the non-CDQ fisheries again on September 1, 2000. The non-CDQ fisheries were open between September 1 and December 9, 2000. NMFS reallocated about 11,000 mt of Pacific cod from the trawl to non-trawl sectors on October 27, 2000 which contributed to the long fall/winter opening for Pacific cod.

Table C-65. Catch of Pacific cod in the CDQ fisheries by season, 1999, 2000, and 2001 through September 16, 2001

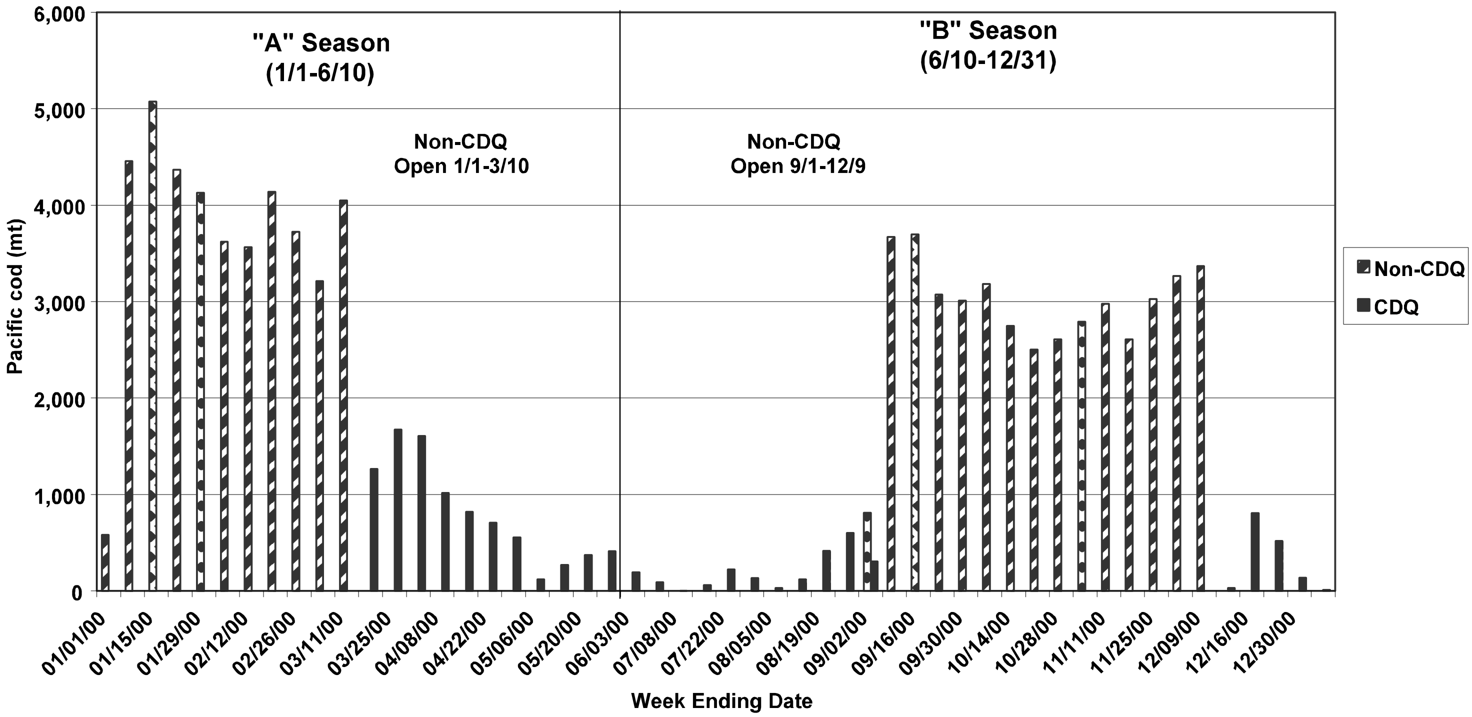
Season and Annual Totals	1999	2000	2001
1/1 - 6/10 Catch (% of total)	4,854 (39%)	9,305 (69%)	7,821
6/10 - 12/31 Catch (% of total)	7,641 (61%)	4,222 (31%)	2,024 (thru 9/16/01)
Annual total catch	12,495 (100%)	13,527 (100%)	9,845 (thru 9/16/01)
Annual allocation	13,275	14,527	14,100
% of annual allocation harvested	94%	93%	70% (thru 9/16/01)

(values in metric tons and percentages of total annual catch).

In 2001, the CDQ groups harvested about 55 percent of their Pacific cod CDQ allocation before June 10. They had a somewhat shorter window of time than in 2000 to harvest cod in the spring and summer because the non-CDQ cod fisheries were open from January 1 to March 25 and re-opened on August 15.

Applying the seasonal allocation to Pacific cod CDQ may make it more difficult for the CDQ groups to find sufficient opportunities to harvest Pacific cod than under current regulations, if they want to be able to harvest more than 60 percent of their cod allocation before June 10, as they did in in 2000. The open seasons for non-CDQ cod fishing by longline catcher/processors are longer than for the trawl fisheries for pollock and Atka mackerel, and fishermen do not want to target Pacific cod for CDQ or non-CDQ quotas in the mid-summer due to high bycatch and low product quality. In the last three years, the opening date for second season cod fisheries has been progressively earlier (September 15 to September 1 to August 15), and the non-CDQ longline fisheries usually are extended by reallocations of cod from the trawl sector. These factors increase the chance that the CDQ groups may not have enough time in the “B” season to fully harvest the cod CDQ allocations.

Figure C-7 Catch of BSAI Pacific Cod by Vessels Using Longline Gear in 2000 CDQ vs Non-CDQ Catch by Week



1.4.4.3 Regional Socioeconomic Profiles

A detailed overview of the small communities and villages dependent upon groundfishing in general, and Pacific cod, pollock, and Atka mackerel related activities in particular, may be found in Section 3.12.2 of this SEIS, and this information is supplemented by Appendix F(1) of this document. These regional summaries and community profiles are updates of the Sector and Regional Profiles of the North Pacific Groundfish Fisheries (in press) that were originally prepared in connection with the much broader Programmatic SEIS for the Bering Sea, Aleutian Islands, and Gulf of Alaska groundfish fisheries. They provide a useful overview of these dependent regions and communities, placing the proposed SSL Protection Measure action in a clearer context and are not recapitulated here.

1.5 Consistency with National Standards

The following section addresses issues raised by the National Standards, as contained in the Magnuson-Stevens Act (Act), including a brief discussion of the consistency of the proposed alternatives with each, where applicable.

<u>National Standard 1 - Conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery</u>

Pacific cod, pollock, and Atka mackerel fisheries will continue to be managed to achieve the TAC, without overfishing. Pacific cod and pollock stocks in the GOA, and cod, pollock and Atka mackerel stocks in the BSAI are not currently in danger of overfishing and are considered stable. Overall yields, from one or more of the stocks, may be affected by the suite of proposed actions. In terms of achieving 'optimum yield' from the fishery, the Act defines 'optimum', with respect to yield from the fishery, as the amount of fish which:

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and *taking into account the protection of marine ecosystems*; (emphasis added)
(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or *ecological factor*; (emphasis added) and,
(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

Overall benefits to the Nation may be affected by these trade-offs, though the agency's current ability to quantify those effects is quite limited. While differential distributional impacts among fishing vessels and processing sectors are implied by a comparison of the alternatives, overall net benefits to the Nation should be enhanced by the SSL Protection Measure alternatives under consideration, especially in light of society's implicit "non-use" value, as reflected in ESA language concerning listed species restoration and protection, as well as (emphasized) elements of subheading (A) and (B), immediately above.

<u>National Standard 2 - Conservation and management measures shall be based upon the best scientific information available.</u>

Information in this analysis represents the most current, comprehensive set of information available to the agency (and the Council), recognizing that some information (such as operational costs) is unavailable. Each of the alternatives was analyzed based on information that appears to be consistent with this standard to the fullest extent practicable.

National Standard 3- To the extent practicable, an individual stock of fish shall be managed as a unit throughout its range, and interrelated stocks of fish shall be managed as a unit or in close coordination.

The suite of SSL Protection Measure alternatives to the status quo appears to be consistent with this standard. The BSAI Pacific cod, pollock, and Atka mackerel stocks will continue to be managed as a unit throughout their respective ranges, consistent with the agency's understanding of the dynamics of these three stocks. GOA pollock and Pacific cod resources will continue to be managed in an equivalent manner. Where appropriate, separate quotas for each sector will be monitored in-season by NMFS to assure adherence to and consistency with this National Standard.

National Standard 4 - Conservation and management measures shall not discriminate between residents of different states. If it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation shall be (A) fair and equitable to all such fishermen, (B) reasonably calculated to promote conservation, and (C) carried out in such a manner that no particular individual, corporation, or other entity acquires an excessive share of such privileges.

The suite of SSL alternative actions makes no explicit or implicit differentiation among residents of different states, nor does it have as its purpose or intent to allocate or assign fishing privileges.

National Standard 5 - Conservation and management measures shall, where practicable, consider efficiency in the utilization of fishery resources, except that no such measure shall have economic allocation as its sole purpose.

The wording of this standard was changed in the recent Magnuson-Stevens Act authorization, to 'consider' rather than 'promote' efficiency. Efficiency in the context of this change refers to economic efficiency, and the reason for the change has been interpreted as an effort to de-emphasize, to some degree, the importance of economics relative to other considerations (Senate Report of the Committee on Commerce, Science, and Transportation on S. 39, the Sustainable Fisheries Act, 1996). The analysis presents information relative to these perspectives, but does not point to a preferred alternative in terms of this standard. National Standard 5 recognizes the importance of various other issues, in addition to economic efficiency, not the least of which, in the current case, is the objective of, "*the protection of marine ecosystems*" (e.g., the western stock of Steller sea lions and the habitat upon which it depends).

National Standard 6 - Conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches.

Limitations imposed by the SSL Protection Measure alternative (no matter which among the suite of options before the Council is ultimately selected), will likely reduce the flexibility of fishermen to respond to variations among pollock, Pacific cod, and Atka mackerel fisheries, fisheries resources, and catches. While, as required, the proposed alternatives take these effects into account, they are balanced with the requirement to achieve the primary objective of the action, to protect and enhance the recovery of the western stock of Steller sea lions.

National Standard 7 - Conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication.

The proposed SSL Protection action appears to be consistent with this standard, as it builds on the RPA, original SSL ER program (in place for the 2001 fishing year), and the work of the Council's Steller Sea Lion RPA Advisory Committee. Building upon the regulatory framework and management experience of the 2001 emergency rule should help to minimize unnecessary duplication and minimize implementation costs.

National Standard 8 - Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities.

Many of the coastal communities in Alaska and the Pacific Northwest participate in these GOA and BSAI groundfish fisheries, in one way or another, whether it be as host to processing facilities and support businesses, or as the harbor/home/operating port to vessel operators, fishermen, and processing workers. Major groundfish ports in Alaska that process catch from the Bering Sea include Dutch Harbor, St. Paul, Akutan, Sand Point, King Cove, and Kodiak. Additionally, the Seattle, Washington area is home port to many catcher and catcher/processor vessels operating in these fisheries. Summary information on 126 of these coastal communities is provided in "*Faces of the Fisheries*" (NPFMC 1994). A more recent set of profiles of the key Alaska coastal communities, associated with the fisheries of concern in the current action, is contained above, in the RIR analysis.

In terms of potential impacts resulting from the proposed suite of SSL Protection Measure alternatives for the pollock, Pacific cod, and Atka mackerel fishery, the analysts reviewed data on (1) harvest levels, by vessels in each sector; (2) price and revenues resulting from that harvest; (3) where those harvests are traditionally delivered for processing or for first wholesale (in the case of catcher/processors), and (4) the home port of vessels engaged in each fishery. This information is detailed in Section 1.4 of this analysis. Much of the information used in the detailed economic and socioeconomic analysis cannot be presented, in its disaggregate form, due to confidentiality restrictions, but is summarized qualitatively. The information presented here does not attempt to trace the full economic impact of these revenue changes through the communities involved, nor does this analysis attempt to predict changes in such economic activity from the proposed alternatives; rather, it is provided as a broad indicator of the relative importance of the Pacific cod, pollock, and Atka target fisheries to vessels from these communities, in the recent past.

National Standard 9 -Conservation and management measures shall, to the extent practicable, (A) minimize bycatch, and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.

Sections 3.5 and 4.5 of this SEIS present information on historical bycatch patterns in the pollock, Pacific cod, and Atka mackerel target fisheries. In summary, bycatch rates in the Pacific cod fixed gear fisheries are relatively low, overall, as are rates in the pollock trawl fishery (especially since the prohibition on 'bottom trawling' for pollock). Atka and Pacific cod trawl bycatch rates are significantly higher. Provisions among one or more of the SSL alternatives to the status quo could have several undesirable effects on bycatch rates, as effort is displaced into areas and times which are historically associated with increased bycatch. All of these associations and implications are treated at length in the RIR. Regulatory provisions which are in place, at present (e.g., IR/IU, PSC caps), are anticipated to serve as incentives for the fleets to "minimize bycatch and mortality of such bycatch", to the maximum extent practicable.

National Standard 10 - Conservation and management measures shall, to the extent practicable, promote the safety of human life at sea.

The suite of alternatives which comprise the SSL Protection Measure proposal, before the Council, appears to be consistent with this standard, to the extent practicable, while simultaneously achieving the ESA mandate to avoid SSL jeopardy or adverse modification of SSL habitat. None of the changes in the proposed alternatives would substantially change safety 'requirements' for fishing vessels. Nonetheless, fishing in the Bering Sea, Aleutian Islands, and Gulf of Alaska is a high risk enterprise, fraught with potential risk. Provisions of the suite of SSL alternatives under consideration here, which provide exemptions to the smallest vessel classes, from some time and area closures, reflects an explicit effort to be responsive to the requirements of this National Standard, while achieving the primary objective of this action.

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